EXHIBIT 4

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

JOSEF A. KOHEN, BREAKWATER TRADING LLC, and RICHARD HERSHEY, Plaintiffs, v. PACIFIC INVESTMENT MANAGEMENT COMPANY LLC, and PIMCO FUNDS, Defendants.	No. 05 C 4681 Judge Ronald A. Guzman Magistrate Michael T. Mason

EXPERT REPORT OF DR. CRAIG PIRRONG

I. INTRODUCTION

1. I have been retained by the law firm of Lovell, Stewart, and Halebian LLP, which represents the plaintiff class in this case, as an expert in the fields of futures markets, Treasury security markets, and market manipulation.

2. I have been asked to express an opinion regarding certain issues including, inter alia: (1) Did PIMCO commit manipulative acts?; (2) Were Treasury note and Treasury note futures prices artificial during the period 9 May, 2005-30 June, 2005? (3) What was the dollar impact of PIMCO's acts and these artificial prices?; and (4) What were the damages resulting from PIMCO's acts and this artificiality?

3. I am being compensated at a rate of $500 per hour. My compensation is not dependent on or related in any manner to the outcome of the current litigation. I have no financial interest whatsoever in the outcome of the litigation.

4. This report has been prepared in accordance with the requirements of Rule 26 (a)(2)(B) of the Federal Rules of Civil Procedure. It contains the opinions I intend to offer, the basis for these opinions, the information underlying these opinions, exhibits that support these opinions, and my *curriculum vitae*. My work is ongoing, and I reserve the right to supplement the opinions expressed herein, or the reasoning and information supporting them, in order to respond to PIMCO's experts, or as I otherwise deem appropriate.

II. QUALIFICATIONS

5. I am Professor of Finance, and Director of the Global Energy Management Institute at the Bauer College of Business of the University of Houston. Prior to joining the faculty of the University of Houston in January, 2003, I was the Watson Family Professor of Commodity and Financial Risk Management at Oklahoma State University. I assumed this endowed professorship in 2001 after holding research and teaching positions at the University of Michigan, the University of Chicago and Washington University. My curriculum vitae is attached as Exhibit 1. It lists all of the publications that I have authored in the last ten years. It also lists cases in which I have testified as an expert at trial or by deposition within the preceding four years.
6. I have researched the economics of financial, futures, and securities markets for most of my academic career. I have published scholarly articles concerning financial, securities and futures markets. I have written articles on the behavior of futures prices, the organization and governance of futures exchanges, and various aspects of futures market regulation, including the regulation of market manipulation.

7. As an academic and consultant, I have been deeply involved for about 20 years in issues relating to commodity futures markets, commodity prices, and the economics of commodity market manipulation. My research has been published in a wide variety of scholarly journals. I have been a referee for many journals, including the *American Economic Review*, the *Journal of Finance*, the *Journal of Law and Economics*, the *Journal of Futures Markets*, *Economic Inquiry*, the *Journal of Economic Behavior and Organization*, the *Journal of Business*, and the *Journal of Business and Economics Statistics*.

8. Much of this research has focused specifically on issues of market manipulation. I have published a book (titled *The Economics, Law, and Public Policy of Market Power Manipulation*), as well as 8 economics, finance, and law review articles, on the subject.

9. I was the primary author of a study commissioned by the Chicago Board of Trade, later published as a book titled *Grain Futures Markets: An Economic Appraisal*. That study analyzed the economics of the delivery system for CBOT corn, wheat, and soybean futures contracts, specifically focusing on how to revise that system to make it less vulnerable to manipulation. I recommended the adoption of a multiple delivery point system, and specifically analyzed the pricing and hedging implications of such a system. Parts of this research on multiple deliverable contracts was published in a peer reviewed journal.

10. In 1992 I was a member of the MidAmerica Institute for Public Policy Research Treasury Securities Market Task Force. This Task Force was formed in the aftermath of the Salomon Brothers squeeze of the two year Treasury note. I investigated issues

relating to microstructure and market power in the market for Treasury Notes and Bonds.

11. I have consulted with commodity exchanges in Sweden and Germany regarding the design of futures contracts, including the design of the delivery mechanisms for woodpulp, European wheat and European pigs. A main objective was to design contracts that were not vulnerable to manipulation.

12. In 1997 and 1998 I served as a member of the CBOT's Grain Delivery Task Force ("GDTF"). This body was charged by the exchange with the responsibility of designing new delivery terms for CBOT corn and soybean futures contracts. Such a redesign was mandated by the CFTC because the old delivery mechanism had become unduly susceptible to manipulation. Among the Task Force's objectives was to design a contract that would tend to prevent and diminish the likelihood of price manipulation. The terms recommended by the GDTF were adopted by a large majority of the CBOT membership, and approved by the Commodity Futures Trading Commission (with some modifications for soybeans) in May, 1998.

13. I provided expert testimony in a case related to market manipulation, In re Soybean Futures Litigation, Nos. 89 C 7009, 90 C 11138 (N.D.Ill). I have also been retained by the Commodity Futures Trading Commission as an economic expert in a commodity manipulation case. I have also been retained as an expert in manipulation matters by the Winnipeg Commodity Exchange, pursuant to enforcement actions undertaken by the WCE. In addition, I provided expert testimony in another

manipulation case, Sanner v. Chicago Board of Trade (N.D.Ill). My research has also been cited in a 7th Circuit Court of Appeals decision on manipulation.[1]

14. I was retained by the Federal Energy Regulatory Commission to make a one day presentation on the economics, law, and regulation of market manipulation to economists, analysts, and attorneys in the agency's Office of Market Oversight and Investigation.

15. While employed as a Senior Investment Strategist at a futures commission merchant in Chicago in the mid-1980s, I analyzed Treasury bond and note futures markets on a daily basis, and devised risk management and investment strategies employing these instruments. While so engaged, I developed models to determine the fair value of Treasury futures contracts. These included models to determine the value of delivery options in a multiple-delivery contract.

16. I have taught courses on derivatives (including Treasury futures) at the graduate and undergraduate levels for 18 years. These courses have covered the pricing of derivatives instruments, including Treasury futures, the use of derivatives for hedging and speculative purposes, repurchase agreements, and manipulation. I currently teach the PhD course in futures and options in the Bauer College of Business at the University of Houston.

III. FUTURES MARKETS AND MANIPULATION

17. Futures contracts are standardized financial instruments traded on organized exchanges. These contracts obligate the buyer (the "long") to purchase a specified financial instrument commodity at a particular date in the future. Similarly, they obligate the

[1] Board of Trade of the City of Chicago v. Securities and Exchange Commission, 187 F.3d 713 (7th Circuit, 1999).

seller (the "short") to delivery this commodity. The terms of the transaction, notably the deliverable commodity, the quantity, and the time and location of delivery, are standardized and established by the exchange. The buyer and the seller agree to a price, either in face-to-face negotiations on the floor of the exchange, or through the exchange's computerized trading system.

18. The Ten Year Treasury Note futures contract is traded at the Chicago Board of Trade ("CBOT"). This contract specifies delivery of $100,000 in principal amount of United States Treasury Notes with between 6.5 and 10 years to maturity. Treasury notes are securities issued by the United States government. Treasury note futures contracts expire on a quarterly cycle; the delivery months are March, June, September, and December. Shorts can make delivery on any business day of the delivery month.

19. Prices are quoted in increments ("ticks") of one-thirty second of a point. Prices usually change by a tick between transactions. During 2000-2005, the standard deviation of the daily price change was 14 ticks. Spreads between different futures, and between futures and cash securities, are substantially less variable than daily futures price changes.

20. Because different Treasury notes have different maturities and coupons, they can sell for different prices. In order to reduce the difference between the costs that shorts incur to delivery different notes, the Chicago Board of Trade has implemented a "conversion factor" system; I describe this system in more detail infra. Although the conversion factor system tends to reduce the difference in cost of delivering different securities, it does not eliminate these differences. The instrument that is most economical for shorts to deliver is called the "cheapest-to-deliver" ("CTD") instrument.

21. Although a futures contract held until contract expiration must be closed by delivery (i.e., by the short making and the long taking delivery), almost all futures contracts are closed prior to expiration. That is, prior to expiration, sellers of futures purchase contracts to close their positions, and buyers of futures sell contracts to close their positions.

22. This "liquidation" of futures positions reflects the fact that the primary purpose of a futures contract is not to serve as a means for transferring ownership of the underlying commodity or financial instrument. Instead, the primary purposes of futures contracts are (a) price discovery, and (b) risk transfer. Buyers and sellers of futures can achieve these purposes without making or taking delivery against their contracts.

23. Price discovery is the process by which information about value possessed by disparate market participants is embedded into prices. Those with information that suggests that futures are undervalued (overvalued) buy (sell) contracts, thereby tending to cause the futures price to rise (fall.) As a result of the trading decisions of myriad individuals with information about value, the futures price tends to aggregate this information. By aggregating the information held by numerous individuals, the futures price serves as a valuable signal of supply and demand fundamentals that facilitates the efficient allocation of resources.

24. Futures markets also facilitate risk transfer. For instance, the holder of a portfolio of fixed income securities is subject to interest rate risk; the portfolio tends to rise in value as interest rates fall, and fall in value as interest rates rise. By selling a futures contract with a price that varies inversely with interest rates, the portfolio holder hedges interest rate risk. The futures price falls when interest rates rise, allowing the futures seller to

buy back his contracts at a lower price, thereby earning a profit. This profit offsets in whole or in part the decline in portfolio value that results from the interest rate rise.

25. Most hedgers are "cross hedgers." That is, they are using futures contracts to hedge instruments that are not likely to be delivered against these contracts, or which cannot be delivered at all. For instance, a bank holding a portfolio of mortgages that fluctuates in response to interest rate changes may use Treasury futures to hedge this interest rate risk exposure. Effective cross hedging requires that the futures price and the prices of the instruments that they are hedging exhibit a high correlation. To the extent that both the futures and the prices of the other instruments are affected by the same fundamentals, the futures price and the prices of these other instruments will exhibit high correlation, and the futures contract will serve as an effective hedging mechanism. If the futures price is affected by artificial, technical, and non-fundamental factors, it will exhibit a lower correlation with the prices of other instruments, and hence will be a less effective hedging instrument.

IV. MANIPULATION OF FUTURES MARKETS

26. In order for futures markets to serve as an effective price discovery and risk transfer mechanism, futures prices must accurately reflect supply and demand conditions in the market for the underlying commodity or security. The delivery mechanism is the essential link between the futures market and the underlying ("cash") market. At contract expiration, the futures price and the price of the deliverable instrument converge. The expectation that this will occur at delivery connects futures and cash prices prior to expiration. Therefore, a well-functioning delivery mechanism is essential to the efficient operation of a futures market.

27. Manipulation interferes with the functioning of the delivery mechanism. Manipulation injects artificial demand into the futures market, thereby distorting futures prices. As a result of manipulation, futures prices reflect supply and demand fundamentals less accurately, and hence the futures market is less effective as a price discovery vehicle. Moreover, manipulation distorts price relationships, thereby reducing the correlation between futures prices and the prices of related instruments, and thus reducing the effectiveness of the contract as a hedging mechanism.

28. "Manipulation" takes various forms, one of which is a "market power manipulation." This is also known as "a corner" or "a squeeze."

29. In a long market power manipulation, a trader or group of traders accumulates a long futures position, sometimes augmented with a position in the instrument deliverable against the futures contract, and/or in other derivative instruments (including forward contracts traded over the counter and options). The large long (or longs) cause the futures price to be artificially high by liquidating too few contracts, which sends the signal to the market that there will be excessive deliveries.[2]

30. By these measures, the manipulator forces shorts to incur excessive, unnecessary costs to obtain the deliverable instrument or buy back their futures positions. Some shorts are willing to bid up the price to buy back their futures positions at inflated prices rather than incur these excessive costs. The long profits by selling futures at this artificially inflated price.

31. In Treasury Note futures markets, by demanding excessive deliveries, a large long may potentially profit in other ways as well. In particular, as noted supra, several

[2] Stephen Craig Pirrong, Manipulation of the Commodity Futures Market Delivery Process, 66 J. of Bus. (1992) 335.

securities are deliverable against Treasury Note futures contracts. Some of these securities are more valuable than others. By demanding more deliveries than can be satisfied from the available supply of cheaper securities, the long may force shorts to deliver more valuable ones. Since in a competitive market shorts anticipate that the futures price will converge to the price of the cheaper securities, this unexpected need to deliver more expensive ones imposes a windfall loss on shorts—and results in a windfall gain for the large long.

32. That is, it is a manipulative act to demand excessive deliveries or to liquidate too few futures contracts. The manipulator demands excessive deliveries to force up the futures price, thereby allowing him to liquidate some positions at an artificially high price, or to force delivery of more valuable deliverable instruments.

33. A manipulator acts in this way to influence prices. That is, he is a price maker (and price influencer) rather than a competitive price taker.

34. More specifically, a market participant should not stand for delivery when futures prices, and the prices of the cheapest deliverable instrument, are demonstrably high relative to the prices of closely related instruments. In the face of demonstrably high prices, a responsible long acting without the ability or intent to influence prices will sell (i.e., liquidate) the expensive futures and buy the cheaper instruments. Failure to do so is economic evidence that the participant is attempting to manipulate.

35. The actions of the Chicago Board of Trade in the days after the expiration of the June, 2005 Ten Year Treasury Note futures contract demonstrate that standing for a large number of deliveries in price conditions like those observed in June, 2005 is manipulative. On 29 June, 2005, the CBOT amended Regulation 425.01 "to establish

position limits for all Treasury futures contracts during the last ten days of trading."[3] As a result of this action, the CBOT limited the size of the position that a party can hold during the last ten trading days of the Ten Year Treasury Note futures contract to no more than 50,000 contracts; this position limit constrains the number of deliveries a long can take.

36. The CBOT took this action this with the express purpose of preventing price manipulation. In a letter to the Futures Industry Association, the CBOT stated: "the CBOT's decision to implement position limits was a prudent and proactive initiative intended to preserve the integrity of price convergence between cash and futures, to insulate Treasury futures from potential manipulative conduct and the perception of 'squeeze' conditions."[4]

37. The CBOT's explicit statement that its position limits—which first and foremost constrain the ability of a single trader to take a large number of deliveries against Treasury futures contracts—were specifically intended to prevent manipulation illustrates that taking large deliveries can be a manipulative act.

38. Market participants sometimes engage in other overt acts to manipulate the market. For instance, manipulators sometimes attempt to acquire some of the deliverable supply. This sends strong signals to the market that deliverable instruments may become more expensive to obtain; this inflates the price of the future.

39. Manipulation distorts prices and price relationships. Specifically, long manipulation causes the price of the future, and the price of the cheapest-to-deliver instrument, to rise relative to the prices of other, related instruments. As a result of the

[3] Pl. Ex. 12.
[4] Letter from the CBOT to the Futures Industry Association, 10 August, 2005.

manipulator's conduct, including the threat (expressed through failure to liquidate) of standing for excessive deliveries, there is an artificially high demand for the cheapest deliverable. This causes its price—and the price of the related future—to reflect artificial influences, rather than fundamental supply and demand forces. As a result, the futures price becomes a less reliable signal of supply a

40. nd demand fundamentals. Moreover, because manipulation distorts the relationship between the futures price and the prices of related instruments that market participants hedge using the futures contract, manipulation makes the futures market a less reliable and effective risk transfer mechanism.

41. In sum, futures markets perform socially useful functions. They facilitate efficient pricing, the discovery of valuable information about supply and demand, and the efficient transfer of risk. Manipulation interferes with the market's ability to achieve these beneficial purposes.

V. MANIPULATIVE ACTS

42. A variety of acts are manipulative, including:

- Standing for excessive deliveries, and particularly standing for large deliveries when prices and price relationships indicate that the futures is expensive relative to the underlying deliverable, and the futures and the underlying deliverable are expensive relative to related instruments.[5]

[5] Pirrong, supra note 2. Frank Easterbrook, Monopoly, Manipulation, and the Regulation of Futures Markets 59 J. Bus. S103 (1986). Stephen Craig Pirrong, Commodity Market Manipulation Law: A (Very) Critical Analysis and A Proposed Alternative, 51Washington & Lee L. Rev. (1994).

- Failing to liquidate a large long futures position, particularly when prices and price relationships indicate that the prices of the futures and/or the underlying deliverable are high relative to the prices of related instruments.[6]
- Acquiring a large long position in the deliverable instrument, in conjunction with a large long futures position.[7] In Treasury futures markets, it is possible to acquire a large long position in the deliverable instrument via outright purchases, basis trades (also known as "exchange for physical" or "EFP" transactions), and repurchase market transactions.
- "Painting the tape." That is, the execution of large purchases (or sales), especially in an illiquid market, in order to influence the trading or settlement price of a futures contract.[8]

43. Manipulation is illegal, and a violation of exchange rules. Regulators and exchanges monitor markets and market activity in order to prevent manipulation. In order to succeed, in most manipulations, the manipulator proactively approaches the regulator to forestall regulatory action. Therefore, as occurred in this case, regulatory action may be delayed until after trading is over and limited to prospective efforts to prevent future manipulations.

44. Although exchanges monitor market activity for manipulation, and sometimes exert pressure to liquidate on those whom exchange surveillance personnel believe may be attempting to squeeze a market, overt exchange intervention is the exception, rather than

[6] Pirrong, supra note 2. Easterbrook, Id. Craig Pirrong, Detecting Manipulation in Futures Markets: The Ferruzzi Soybean Episode, 6 Amer. Law & Econ. Rev. (2004) 28.
[7] Pirrong, supra note 2. Easterbrook, supra note 5. Pirrong supra note 7.
[8] Jerry Markham, Manipulation: The Unprosecutable Crime, 8 Yale J. on Reg. (1991) 281.

the rule.[9] In general, exchanges prefer to avoid actions that have market impact, such as establishing settlement prices or forcing liquidations by larger traders.[10] Therefore, in my opinion, lack of overt exchange intervention does not imply that manipulative acts have not occurred.

VI. PIMCO'S MANIPULATIVE ACTS

45. I have reviewed the record in this case. Based on this review, in my opinion, PIMCO engaged in all of the manipulative acts described above (and some more as well) with respect to the June, 2005 Ten Year Treasury Note futures contract. Specifically, PIMCO:

- Stood for delivery on an excessive number of futures contracts; equivalently, it liquidated too few contracts. This caused the June contract to be overpriced relative to the cheapest-to-deliver instrument, overpriced relative to related instruments, and sent manipulative signals to the market.
- Refused to liquidate its position, which caused (by PIMCO's own calculations) the futures price to be overpriced relative to other, related instruments. This failure to liquidate was contrary to PIMCO's conduct in previous futures contracts, and also contrary to its own stated investment strategy of buying underpriced and selling overpriced instruments.
- Bought increasingly larger quantities of the cheapest deliverable security as the delivery period was approaching. PIMCO lent out most of these CTD securities during May and June, 20005. However, PIMCO did so in a way that increased

[9] Stephen Craig Pirrong, The Self-Regulation of Commodity Exchanges: The Case of Market Manipulation, 38 J. Law & Econ. (1995) 141.
[10] Indeed, exchanges have been sued for manipulation for forcing liquidations. Sanner v. Chicago Board of Trade.

prices artificially, because those who borrowed the CTD from PIMCO were legally obligated to return them prior to the end of the delivery period, and hence could not deliver them against futures without failing to perform on the repo contract.

- Acquired control of a large quantity of the cheapest deliverable security at the end of the delivery period via a reverse repurchase transaction for which there was no legitimate commercial purpose, but which facilitated PIMCO's manipulative squeeze.
- Bought a large number of futures contracts immediately prior to the end of trading of the June futures contract expressly in order to increase the richness of the futures price because it was in PIMCO's interest to have the contract settle at a high price.
- Made incomplete statements to regulators and CBOT officials.

46. In my opinion, all of these actions were consistent with the behavior of a price-making manipulator, and are clearly inconsistent with the actions of a competitive, commercially reasonable, price taking entity. This is revealed by, inter alia: PIMCO's standing for enormous deliveries when it was clearly evident that PIMCO had caused the futures price to be artificially high relative to the cheapest-to-deliver and related instruments; PIMCO's holding of large futures positions and positions in the CTD note despite the fact that there were cheaper alternative investments; PIMCO's squeeze of the CTD; its market-on-close order on 21 June, 2005; the structure of its repurchase positions; its reverse repurchase transactions in late-June, 2005; and its internal emails and the testimony of PIMCO decision makers.

47. Further PIMCO did not act as would a firm that managed individual accounts. Instead, it acted to coordinate the trading of those accounts as necessary to cause an artificial price, and intended to exploit such power. But for its knowledge that it had the ability to influence prices, and an intent to profit from that ability, PIMCO would have traded quite differently. To an economist, this difference between the behavior of a price taking firm that cannot (or has no intent to) influence prices and the behavior of a manipulator is the hallmark of manipulative intent.

48. In order to execute a market power manipulation, an entity threatens to take more deliveries than can be supplied at the competitive price.

49. The threat of large deliveries facilitates manipulation in at least two ways. First, where the supply curve of the deliverable is upward sloping, by threatening to take massive deliveries a large long can force the marginal cost of making additional deliveries above the competitive price. Since shorts are willing to pay any price up to the marginal cost of the threatened delivery to liquidate their positions, driving up this marginal cost increases the price at which the long can liquidate its contracts. Second, in a market such as the Treasury Note Futures market, in which some deliverable securities are more valuable than others, by demanding excessive deliveries a large long can increase the likelihood of receiving these more valuable securities, rather than the cheaper securities that would—and should—be delivered in a competitive market. That is, a large long can profit by forcing "uneconomic deliveries" of non-CTD securities.

50. PIMCO took immense deliveries on the June, 2005 Treasury Note Futures contract. Specifically, it took delivery of over 130,000 contracts, representing approximately

$13 billion in face amount of Treasury notes. This represented 93 percent of the total deliveries against the June 2005 contract.

51. Indeed, PIMCO took larger deliveries against the June 2005 contract than had ever been taken against any Treasury Futures contract traded at the Chicago Board of Trade, including the Two Year, Five Year, Ten Year and Thirty Year Treasury Futures contracts, in the 28 year history of trading of the Treasury complex. In fact, in June, 2005, PIMCO alone took more deliveries than had ever been taken by all longs on any particular Treasury futures contract.

52. Prior to June, 2005, the largest delivery against the 10 Year Treasury Futures contract had been 115,815 contracts taken against the March contract. On average, from March, 2000-December, 2005 (excluding the June 2005 contract), longs collectively took delivery on 32,818 contracts. Thus, in June 2005 PIMCO took delivery of about 4 times as many notes as had been delivered on average on other contracts in the 2000-2005 period.

53. The threat of taking of such large deliveries, and then actually taking them, is consistent with the actions of a manipulative, "price making" trader.

54. At the time it issued its regulation limiting positions on Treasury Note futures expiring in December, 2005 and later to 50,000 contracts during the last ten days of the delivery month, the CBOT knew that since trading had ended, PIMCO had to take delivery on more than 130,000 contracts.

55. PIMCO had never taken deliveries on the Ten Year Treasury Note futures contract in anything like the quantities it took in June, 2005. Indeed, PIMCO had not taken any deliveries on the previous three Treasury Note futures contracts.

56. PIMCO well knew that by threatening to take such large deliveries, a single large player could have a bigger price impact, ceteris paribus, than several large participants acting independently. Specifically, Mr. Zhu wrote that "coordinated squeeze by several HFs is very unlikely to succeed in the end . . . . really need a SINGLE large player to squeeze through taking delivery process."[11]

57. Mr. Zhu explicitly states that one squeezes "through taking deliver[ies]." In Mr. Zhu's analysis, a single large participant—as PIMCO was in June, 2005—could manipulate more effectively than a collection of large traders.

58. I agree with Mr. Zhu's analysis. I have published an economic model that arrives at the same conclusion.[12]

59. PIMCO (primarily Mr. Zhu) consistently attributed the richness in the September futures contract to hedge funds that he believed (and that he believed that the market believed) were successfully squeezing that contract and the underlying CTD instrument long before the futures delivery period. Mr. Zhu's well-founded belief that a single player can manipulate more effectively by threatening to take delivery than can several hedge funds, implies that Mr. Zhu was also well aware that as a single large player, PIMCO was manipulating in May and June, 2005.

60. In order to take these large deliveries, PIMCO held an immense futures position through the last day of trading on the June contract—21 June, 2005. Throughout much of this period, the June futures contract, and the February, 2012 CTD note, were overpriced relative to alternative investments available to PIMCO. Indeed, PIMCO was keenly aware of this richness.

---

[11] Pl. Ex. 51. Emphasis in original.

[12] Stephen Craig Pirrong, The Economics, Law, and Public Policy of Market Power Manipulation (1996).

61. This report, at section VII infra, demonstrates that the June contract was substantially overpriced (rich) throughout the class period. Moreover, PIMCO's own daily analysis of futures prices shows definitively that PIMCO knew the June contract was rich.

62. Per PIMCO's own calculations, June futures were between 2.8 and 13.9 basis points rich relative to the CTD. That is, if it was a price taking firm that had no influence over price, and had no intent to cause an artificial price, PIMCO could have gained 2.8 and 13.9 basis points by selling futures rather than standing for delivery of the CTD note. Thus, if PIMCO intended to sell rich instruments and buy cheap ones to profit on relative valuation differences, it should have sold futures rather than held futures and eventually standing for delivery. Holding onto, rather than selling, overpriced futures contract is not consistent with the behavior of a competitive trader who intends to profit from price disparities without influencing these disparities through its trading.

63. The Chicago Board of Trade's Business Conduct Committee specifically questioned PIMCO's Mr. Rodosky on the reasonableness of taking delivery against futures at a time when those futures were rich relative to the CTD.[13] I agree with the implication of this question: a trader would not have stood for delivery under these circumstances except as part of a manipulative scheme.

64. My calculations, presented in section VII infra, and in Exhibit 2, demonstrate that the June futures was substantially rich relative to the CTD.

65. PIMCO could have purchased other instruments that were, per its own estimates, cheaper than June futures. For instance, PIMCO could have purchased additional

[13] Pl. Ex. 148.

quantities of the "on-the-run" (the most recently issued) 10 year Treasury; the on-the-run security is typically the most liquid instrument, and hence is the cheapest to trade. Per PIMCO's own calculations, during the class period the June futures contract was as much as 14.2 basis points rich relative to the on-the-run note. As late as 8 June, the futures price was 8.1 basis points rich relative to the on-the-run note, and remained rich (with the exception of two days) until the last day of trading on the contract.

66. That is, a price taking, competitive firm could have sold the futures, bought the on-the-run 10 year, and picked up as much as 14.2 basis points in yield. Throughout the period, PIMCO could have sold futures and bought additional quantities of the on-the-run 10 year note, and profited from the yield disparity. But for an ability and intent to influence prices, this would have been the profitable thing to do—yet PIMCO continued to hold large futures positions rather than sell additional futures and buy additional on-the-runs to pick up this yield differential. This is inconsistent with the behavior of a competitive, price taking market participant.

67. Indeed, there were those at PIMCO who recognized this. On 23 May, 2005, Vineer Bhansali emailed Mr. Zhu, Mr. Gross, and Mr. Chris Dialynas. Mr. Bhansali wrote: "[c]oming in the contract on Friday was rich 4-5 ticks. . . . looks it would have made sense to sell the contract into this bid and do a basis trade vs. non-CTD."[14] That is, Mr. Bhansali recommended selling the June, and buying non-CTD securities. This would indeed have been the thing to do had PIMCO been following its stated strategy of selling rich instruments and buying cheap ones, that is, if it had been acting as a

[14] Pl. Ex. 192.

competitive price taking relative value trader exploiting apparent mispricings, rather than acting to create them.

68. Nor was Mr. Bhansali alone in his appraisal. On 23 May, Mr. Zhu noted that several PIMCO portfolio managers desired to move out of the rich June contract.[15] On 26 May, 2005, Ivan Sbotskov moved $10 million out of the June Treasury futures into swap futures.[16] Nonetheless, PIMCO reduced its long futures position at a much slower rate than the rest of the market.

69. Several PIMCO accounts were short futures. The owners of these accounts were harmed by manipulative acts that caused the futures price to be artificially high. Despite the harm that manipulation did to the accounts that were short futures, PIMCO engaged in manipulative acts. Indeed, Mr. Gross instructed Mr. Keller "to extract maximum value" from PIMCO's net long June futures positions.[17] That is, Mr. Gross instructed Mr. Keller to maximize the value of the net long futures position that conferred market power on PIMCO, rather focus on the disparate needs and objectives of individual accounts under PIMCO management.

70. Rather than exploit this opportunity to profit from the richness of the futures relative to on-the-run securities, PIMCO held an immense futures position, eventually standing for delivery on about $13 billion of the February, 2012 note. By so doing, it (a) passed up the opportunity to capture a yield differential, (b) passed up the opportunity to move into a more liquid instrument, and (c) took delivery of a relatively illiquid instrument.

---

[15] Pl. Ex. 11.
[16] Pl. Ex. 26.
[17] Pl. Ex. 9.

71. PIMCO knew of the relative illiquidity of the February, 2012 note. This relative illiquidity was perfectly understandable since: (a) relatively "old" Treasuries are typically far less liquid than on-the-run issues, or other more recently issued notes; and (b) the February, 2012 note was no longer deliverable against Treasury futures after the June expiry.

72. Indeed, PIMCO acknowledged the illiquidity of the February, 2012 note in a letter to the Securities and Exchange Commission ("SEC"). It noted that by taking delivery, it would "end up owning a large position in a fairly illiquid cash treasury security, which in this case, was the Feb. 12 note."[18]

73. The bid-ask spread—the difference between which one can buy or sell a particular security using a market order—is a common measure of liquidity and transactions costs. I estimate that during the class period, the bid-ask spread on the February, 2012 note was one tick per $100 in face amount.[19] Mr. Rodosky testified that the CTD is often more liquid than other off-the-run securities.[20] Since the February, 2012 note would no longer be deliverable post-30 June, and hence could not be CTD, this implies that the post-30 June bid-ask spread would have been no lower than one tick, and perhaps higher than one tick. Indeed, when soliciting bids for its immense position in the February, 2012 post-June 30, PIMCO a major market participant (Goldman-Sachs) quoted a spread of two ticks.[21]

74. In contrast, I have estimated that during May and June, 2005, the spread for the on-the-run ten year Treasury note was one-half tick (i.e., 1/64th rather than 1/32nd).

---

[18] Pl. Ex. 39.
[19] A "tick" is 1/32nd of one percent of par value.
[20] Rodosky Dep. 1 at 27.
[21] Email from C. Zhu to L. Hsu, 2 August, 2005.

Therefore, by accumulating approximately $18 billion of a less liquid security, PIMCO incurred additional liquidity costs (from the higher spread) of between $2.8125 million and $8.4375 million over and above the costs it would have incurred from purchasing the on-the-run Ten Year note.[22] Moreover, the on-the-run note was cheap—per PIMCO's own calculations—relative to the futures.

75. Thus, there were strong economic considerations militating against taking ownership of $18 billion of an old Treasury note. Indeed, PIMCO represented to the CBOT that it had no desire to own large quantities of the February, 2012 note.[23] Moreover, on several occasions during May-July, 2005 PIMCO employees discussed how to dispose of the immense quantities of notes it took, or anticipated that it would take, on delivery.[24] In the futures business, this disposal of deliveries is sometimes referred to as "burying the corpse" of a manipulation. PIMCO had not owned such an immense quantity of a non-deliverable Treasury note during the period of time covered by Defendant's production. In my opinion, this indicates that such holdings are not a normal element of PIMCO's investment strategy, and hence the company must have had another—manipulative—purpose for acquiring such an immense position.

76. PIMCO intended to squeeze the CTD note after delivery. PIMCO kept June contract prices artificially high based on its intent to "build liquidity" for itself in this note by squeezing the note after delivery in the repo market. That is, despite the facts that (a) the issue was trading special in the repo market, and (b) the issue was failing in the

[22] Indeed, this may underestimate the additional transactions costs. The on-the-run Ten Year note had a higher duration than the CTD note or the futures, and hence PIMCO could have achieved the same duration by purchasing a smaller quantity of the on-the-run note, and hence incurred lower transactions costs.
[23] Pl. Ex. 8.
[24] Pl. Ex. 3.

repo market, PIMCO lent out only a small fraction of its position in the February, 2012 note. This is a classic repo squeeze strategy.

77. In the event, PIMCO had serious difficulties liquidating its huge position in February, 2012 notes. On 11 August, Mr. Keller informed Mr. Gross that these securities had cheapened relative to notes of similar maturities, and that "we have pushed these too far, too fast."[25] This cheapening is a predictable consequence of "burying the corpse" of a manipulation; PIMCO's huge holding of the February, 2012 note were the corpse.

78. This course of conduct—refusing to sell rich futures, eventually taking delivery of large quantities of illiquid notes that it had no reason or intention to hold as part of its long term investment strategy, and then squeezing that note in order to overcome its illiquidity—is incomprehensible except as a manipulative act to cause the price of the June futures to be artificially high so that PIMCO could liquidate the overwhelming majority of its long futures positions at greatly inflated prices. Also, by holding a large long futures position, and standing for delivery, PIMCO increased the probability that it would receive a more valuable security on delivery; that is, it increased the probability of uneconomic deliveries, by which it could profit. Absent such a motive, it would have been profitable for PIMCO to sell futures and buy other instruments, such as the on-the-run securities.

79. Contemporaneous correspondence reveals clearly that PIMCO deliberately and consciously chose during May and June, 2005 not to sell additional futures precisely because it understood keenly that additional sales would have reduced the June

[25] Pl. Ex. 154.

futures price. That is, the firm's traders knew that by selling futures in quantity, PIMCO would have driven down the futures price.

80. For instance, in an 8 June 2005 email to Mr. Zhu, Mr. Keller wrote "basis trading out of june incurs very large transactions costs and can impair the value of our entire position."[26] In an email to CFTC staff member Elverse Alexander on the same day, Keller wrote: "[w]e would like to sell out of June and into cash today to take advantage of rich june futures to cash market but the liquidity is not there. We have been trying to sell June 100 at a time and it is very difficult. If we push the market while trying to liquidate 5-10k today we would simply be destroying the value and liquidity for the remaining 140k we own."[27] That is, Mr. Keller recognized that (a) the June was rich, but (b) selling additional contracts would have eliminated the richness.

81. Withholding liquidations to maintain price richness is a hallmark of manipulation, and is a manipulative act. This speaks to both PIMCO's ability to cause an artificial price (by withholding liquidations) and their intent to keep the price high.

82. Other PIMCO traders shared Mr. Keller's views. For instance, on 9 June, 2005, Mr. Rodosky wrote Mr. Keller: "Liquidity in the June contract is so thin though, that we are unable to move a significant percentage of our position. I will point out that the market is typically 50-100 contracts up, and hitting a bid moves the calendar [i.e., the June-September spread] by a quarter to a half tick immediately. I will then note that we must be respectful of those levels at which we execute on behalf of our clients, i.e., if the contract is 6 ticks rich, we don't want to wipe out the richness of the

[26] Pl. Ex. 50.
[27] Pl. Ex. 66.

contract and only have 1000 sales to show for it." Similarly, on 15 June Mr. Rodosky emailed the Investment Committee that "[o]nce the basis started moving and more people started talking about the open interest decline, I stopped selling, so as not to accelerate the contract's cheapening." Mr. Rodosky's statements reveal clearly that PIMCO deliberately refused to liquidate its positions specifically to maintain the richness in the contract.

83. Put differently, the firm chose not to sell because such sales would have undercut the firm's market power, reduced the likelihood that it could have forced uneconomic deliveries, and thereby reduced the futures price. This is exactly how a manipulator with the power to cause an artificial price, and the intent to do so, would act. It is inconsistent with the behavior of a competitive firm that cannot influence price, and which happily sells instruments that are rich relative to alternative investments. That is, the firm engaged in price making, not price taking, behavior.

84. PIMCO had very specific reasons to take such large deliveries. It wanted to force delivery of more valuable August, 2012 notes—notes that PIMCO repeatedly stated were "rich," a conclusion that is supported by its contemporaneous calculations, and my analysis of the Treasury yield curve. It also wanted to be able to squeeze the February, 2012 note to extract a profit and build liquidity in that issue.

85. There is extensive documentary evidence to demonstrate that PIMCO wanted to retain the ability to force delivery of the rich August notes. On 23 May, 2005, Mr. Zhu emailed Mr. Gross that it was acceptable for PIMCO to use basis trades (which as implemented around this date reduced the supply of the February, 2012 note available for delivery) to "bring our total TYM5 down to 200K. if we take delivery

of 200K, and assume rest of mkt take another 120K (happened [sic]) to TYH5), then 7bln would be non-CTD, which is worth 7/32."[28] That is, PIMCO planned to (a) use basis trades to take possession of additional February, 2012 notes (the CTD), and (b) use large deliveries to force deliveries of non-CTD notes.

86. Similarly, on 25 May, 2005, Mr. Zhu emailed the Investment Committee that "TYM5 vs CTD forward price is 13 ticks rich, which prices in 30% chance of getting delivered next CTD (T 8/12),if we take delivery of 20 bln, and assume rest of mkt takes in 12 bln, for total of 32 bln, vs estimated free-floating size of CTD T2/12 of around 20 bln, the chance of getting non-CTD is 37%, which is worth 15 ticks."[29]

87. Mr. Zhu presented another version of this analysis to the Investment Committee on 1 June, 2005.

88. On 13 June, 2005, Ms. Lori Hsu noted that the "current 'richness' of the futures contract . . . is mostly implied probability of being delivered 8/12s."[30]

89. On 31 May, Mr. Keller emailed the executive committee stating that by "standin[ing] for delivery (take deliveries of 2/12's which may end up being less liquid, potential for windfall gain <u>if delivered more than one issue</u>. . . . At these valuations I would recommend standing for delivery unless we get another chance to basis trade at attractive levels."[31] That is, Mr. Keller specifically recommended a course of action—taking delivery—which was profitable because of the "windfall gain" that would result from forcing uneconomic deliveries.

---

[28] Pl. Ex. 35.
[29] Pl. Ex. 35.
[30] Email from Lori Hsu to Steve Rodosky and Rama Nimbinamadom, 13 June, 2005, 9:16 AM.
[31] Pl. Ex. 38. Emphasis added.

90. It was no secret that the number of deliveries against the futures contract would have a decisive impact on the pricing of the June contract. On 25 May, 2005 James Luxem of J. P. Morgan wrote "[f]air value for the net basis of the CTD depends completely on how large delivery ends up being into the June futures. . . . fair value for the net basis is zero if deliveries are at or below what was delivered in March, but increases sharply as deliveries exceed the amount of Feb '12s available."[32]

91. PIMCO understood this as well. Lori Hsu emailed Chris Dialynas, saying "if we had an infinite supply of 2/12s, then we would have no deliverable option value, because it would remain the CTD into delivery and your net basis reflects the carry to delivery[.] but now, we [have] a finite supply, u have a higher chance of being delivered the next ctd. . . . if that probability is high, then u have a higher 2/12 net basis."[33]

92. Similarly, on 1 June, Mr. Keller emailed Mr. Gross, stating that taking delivery would "richen [the CTD note] up again."[34] Likewise, Mr. Dialynas recommended taking delivery to exploit the opportunity of the notes to go special.[35]

93. In late-May, PIMCO utilized basis trades into the CTD note to liquidate some of its futures positions. It continued to use such basis trades until concern about adverse publicity induced it to eschew this practice. Such transactions did not reduce the firm's effective control of the CTD note, or reduce its potential demand on the cheapest deliverable. Thus, although these trades reduced its futures position, by increasing its ownership of the deliverable supply, they preserved PIMCO's ability to

[32] Pl. Ex. 46.
[33] Pl. Ex. 27.
[34] Pl. Ex. 3.
[35] Pl. Ex. 104.

force delivery of non-CTD notes. Indeed, in a 23 May, 2005 email, Mr. Keller recommended "we take advantage of the current June richness (5.5/32nds) and move our cash constrained accounts (those that do not have enough cash to take delivery now) into the ctd now. We are effectively monetizing [sic] the likelihood of being delivered the second cheapest to deliver."[36] That is, the basis trades were specifically intended to preserve PIMCO's ability to force uneconomic deliveries.

94. In my opinion, the large purchases of the February, 2012 note in mid-May was a manipulative act, and one that signaled to the market the possibility of large demand for deliveries against the June contract. In essence, the basis trades accelerated in time the delivery process and its artificial impact on prices.[37]

95. PIMCO's purchase of 4369 contracts in the last moments of trading of the June contract was also a manipulative act. By purchasing these additional quantities of futures in an illiquid market, PIMCO foreseeably drove up the price of the June futures. This was economically sensible for a manipulator, however, because it also increased its likelihood of receiving non-CTD deliveries.

96. Indeed, the day before, Mr. Keller, Mr. Rodosky, and Mr. Zhu planned their actions for the last day of trading, and Mr. Zhu stated that they would enter their orders in the last minute of trading.[38] In my opinion, an order entered at such a late time would have the maximum price impact because of the low liquidity as trading approaches its end. Inasmuch as Mr. Zhu had previously opined that it was beneficial for the June

[36] Pl. Ex. 35.
[37] The decision to use basis trades may also have been calculated to circumvent the possibility of position limits. Pl. Ex. 35.
[38] Pl. Ex. 133.

contract to close at as high a price as possible[39], in my opinion this plan to submit a large order at the end of trading was an attempt to "paint the tape."

97. Moreover, PIMCO's explanation of this trade is unpersuasive. PIMCO has represented that it needed these additional contracts to cover its "duration tail." However, there were other ways to add duration to its position, including the purchase of more liquid on the run securities. These alternative transactions would have added duration, but would not have increased PIMCO's ability to force uneconomic deliveries. Moreover, these alternative transactions would likely not have had the large price impact that resulted from PIMCO's futures purchase. Thus, but for the desire to affect its ability to force uneconomic deliveries, it would have been more efficient for a sophisticated fixed income market participant such as PIMCO to add duration through transactions other than last-minute futures purchases.

98. Therefore, in my opinion, PIMCO's justification of this trade to the CBOT was misleading.

99. PIMCO was concerned that "recycling" of the CTD note due to early deliveries against futures would reduce its ability to get non-CTD notes via delivery, and considered strategies intended to prevent this from happening. In particular, it considered using "guaranteed repo" transactions that would keep notes delivered prior to 30 June from being redelivered. It even mooted the possibility of using guaranteed repo in discussions with regulators.[40] In the event, early deliveries did not occur, so PIMCO did not have to resort to this expedient. However, its serious consideration

[39] Pl. Ex. 136.
[40] Pl. Ex. 9.

shows that the firm's strategy was predicated on obtaining delivery of non-CTD notes.

100. PIMCO engaged in other acts intended to maximize the probability that it would receive expensive, non-CTD notes via delivery.

101. For instance, in a 23 May, 2005 email to the Investment Committee, Mr. Zhu noted that "in actual delivery process, CBOT uses first in/first out basis in allocating delivery, since we expect non-CTD to be delivered last, it's therefore more efficient for us to close 'older' TYM first, and 'newer' TYM5 has better chance of getting non-CTD." At 6:02 AM the next day, Mr Gross emailed Mr. Zhu, and asked "Changhong—how do we insure our contracts are sold in this way?" Mr. Zhu replied "our system will instruct FIFO to the brokers."[41] That is, Mr. Zhu and Mr. Gross wanted to make sure that PIMCO maximized the probability of receiving non-CTD deliveries.

102. It should be noted that Mr. Gross's evident desire to maximize the probability of receiving the rich non-CTD notes contradicts his sworn testimony in which he claims that PIMCO had no reason to take delivery of rich securities.[42]

103. Moreover, PIMCO's reverse repurchase transaction in February, 2012 notes on 29 June, 2005 was a manipulative act that reduced the supply of CTD notes available to shorts for delivery. Under these reverse repurchase transactions, PIMCO's counterparty was obligated to deliver $2 billion in face amount of the February, 2012 note to PIMCO on 1 July, 2005.

[41] Pl. Ex. 16.
[42] Gross Dep., at 235-236.

104. Since by 29 June the June contract had ceased trading, PIMCO knew that it would receive via delivery over $13 billion of Treasury notes, most of which would be the February, 2012 note. Moreover, PIMCO knew that counterparties were obligated to deliver approximately $4.9 billion in February, 2012 notes pursuant to repurchase transactions.[43] Thus, at the time of the reverse repurchase transactions PIMCO was long approximately $18 billion in the February, 2012 note, representing approximately 70 percent of the issue. For the time period for which PIMCO has provided its positions to plaintiffs, the fund had never held such a large position in the CTD at the end of the delivery month, either absolutely, or as a percentage of the issue of any note. Given the note's illiquidity, and its non-deliverability against futures contracts after 30 June, there was no compelling reason (and indeed no rational reason) for the firm to hold such a large position. Nonetheless, it consciously engaged in a transaction that brought in an additional $2 billion of the note.

105. In my opinion, due to the operational aspects of securities settlement, it was not possible for the $2 billion of notes to be delivered to PIMCO against futures by 30 June, and be delivered to PIMCO against the reverse repurchase transaction by 1 July. Thus, the reverse repurchase transaction effectively made $2 billion of CTD notes undeliverable against futures. This increased the probability that shorts would be forced to deliver uneconomically non-CTD notes against the June futures contract, and in my opinion, this was a manipulative act. The reverse repurchase transaction is not consistent with the prudent actions of a competitive investor.

106. After declining gradually in price after the end of trading on the June, 2005 Treasury Note futures contract, the February, 2012 note rose in price relative to the

[43] Pl. Ex. 20.

prices of comparable securities at the end of June. I estimate that from 28 June to 30 June, the note rose in price by about 7 cents per $100 in face amount more than one would have expected, given the movements in the prices of comparable securities over this period. Manipulative purchases of the February, 2012, including the establishment of a long position via a reverse repo transaction, would be expected to have such an effect.

107. PIMCO's explanation of the reverse repurchase transaction is implausible. In representations to the Federal Reserve Bank of New York, and in deposition testimony, Mr. Keller stated that the reverse repurchase transaction was profitable because it allowed PIMCO to lend money at the general collateral rate via the term reverse repo, and borrow money at a special repo rate on the overnight market.[44]

108. Several observations are in order. First, this explanation conflicts with PIMCO's representation that it was not readily able to participate in the overnight repurchase market.[45]

109. Second, at the time of the reverse repo, PIMCO already knew that it would be the owner of approximately $18 billion in February, 2012 notes that it could have lent out at the special overnight repo rate that it anticipated to prevail in July (assuming, of course, that it could participate in the overnight market.) In my opinion, it had no need for an additional $2 billion in the February, 2012 note. Indeed, at no time during July did PIMCO lend out more than $7.7 billion of its immense holdings of the February, 2012 note, meaning that it did not lend out at least approximately $10 billion; adding the $2 billion obtained via the reverse repo, even on its biggest lending

[44] Pl. Ex. 34. Keller Dep. 1, at 41.
[45] Pl. Ex. 34. Pl. Ex. 37. Pl. Ex. 105.

days in July, PIMCO failed to lend out $12 billion. Indeed, on some days in July and August, PIMCO was a net borrower of notes, and its lending exceeded $5 billon on only five days in July. Thus, for most of the period PIMCO did not lend out between $14 and $16 billion of its February, 2012 note holdings; adding the $2 billion obtained via the reverse repo transaction, PIMCO did not lend out $16 and $18 billion on most days in July.

110. Therefore, the additional $2 billion obtained via the reverse repo transaction was completely superfluous. PIMCO had no need to acquire additional notes to capture the purported mispricing; it could have captured any mispricing by lending out the notes it already had in its possession. Significantly, it did not do so.

111. In fact, the $2 billion reverse repo could not have increased the firm's economic profit unless this action increased the probability of uneconomic deliveries (or it increased its ability to squeeze the repo market post-July 1). Through July and August, PIMCO continuously failed to lend out at least $10 billion in the February, 2012 note. Instead, it merely held those notes in inventory.

112. Second, because it did not lend out its entire inventory of February, 2012 notes, the reverse repurchase transaction could not have increased the firm's profit but for the impact of this transaction on the futures market delivery process (or through its affect on the firm's ability to squeeze the repo market). PIMCO could have lent out the same quantity of notes on the overnight repo market that it did in July-August, 2005 without engaging in the reverse repurchase transaction. This would have allowed it to borrow dollars at the (special) overnight repo rate, and invest the funds obtained thereby at the general collateral rate. At the end of July, it would have

realized the spread (if any) between the general collateral and special rates on the amount lent. Moreover, at the end of July its position in the February, 2012 note would have remained at about $18 billion, as the notes lent out on repo would have been returned.

113. This is exactly the same outcome as the firm realized in practice. It earned the spread between GC repo and special repo on the notes it lent out, and ended up with $18 billion in the February, 2012 note; its end-of-July position in this note was unaffected by the reverse repo and overnight repo transactions because it delivered the notes delivered to it pursuant to the overnight repos to the counterparty in the reverse repo. Thus, the reverse repo transaction had absolutely no affect on its ability to profit from any difference between the term GC rate and the overnight repo rate. Nor did it affect its end-July holdings of the February, 2012 note. Therefore, in my opinion, Mr. Keller's representation regarding the motive for the reverse repo transaction provided to the Federal Reserve Bank of New York was disingenuous.[46] Similarly, in my opinion, PIMCO's explanation of the transaction to the Securities and Exchange Commission was misleading.[47]

114. Relatedly, in my opinion, Mr. Keller's statement to CFTC regulator Elverse Alexander that he was surprised that the February, 2012 note was trading special on the repo market in July was disingenuous.[48] Mr. Keller knew that PIMCO held a massive position in the February, 2012 note, but was lending out only a small fraction of that position. A seasoned Treasury trader like Mr. Keller would have known that specialness results from a shortage of notes, and that PIMCO's failure to lend out

[46] Pl. Ex. 34.
[47] Pl. Ex. 37.
[48] Pl. Ex. 35.

most of its position had the foreseeable effect of creating and/or exacerbating a shortage.

115. Third, given that PIMCO knew that it would be long approximately 80 percent of the total supply of the February, 2012 note post-30 June (and more than 90 percent of the float), it had to have recognized that it would have a dominant position in this note. Hence, PIMCO would have had the ability to influence the amount of specialness by its lending activity; adding the additional $2 billion through the reverse repo only increased its dominant position in the repo market for the February, 2012 note.

116. To the consternation of regulators, the February, 2012 noted traded special and experienced fails during July, 2005. In my opinion, this was the direct result of PIMCO's withholding massive quantities of its holdings of the note from the repo market. PIMCO profited from this repo squeeze by borrowing money at below-GC rates.

117. Therefore, in my opinion, PIMCO engaged in the reverse repurchase transaction pursuant to a strategy that it had employed throughout the class period. Specifically, PIMCO desired to force uneconomic deliveries of rich securities. Tying up additional February, 2012 notes via the reverse repurchase transaction reduced the supply of these relatively cheap notes available for delivery, and increased the probability that shorts would be forced to deliver richer August, 2012 notes.[49]

118. In sum, PIMCO clearly attempted to force delivery of non-CTD notes. In my opinion, such deliveries are uneconomic and manipulative. Forcing non-CTD

[49] Moreover, this transaction increased PIMCO's market power in the post-30 June repo market for the February, 2012 note.

deliveries undermines the economic purpose of futures markets. Specifically, it interferes with price discovery and the utility of the market as a hedging vehicle. Thus, PIMCO engaged in a series of complementary manipulative acts.

119. PIMCO's consistent course of conduct, steadfastly aimed at forcing delivery of rich August, 2012 notes refutes Mr. Gross's and Mr. Zhu's deposition testimony that PIMCO had no interest in obtaining rich securities.[50] Indeed, their statements are implausible on their face, and are contradicted by their deeds during the class period.

120. The structure of PIMCO's repurchase market activity in the February, 2012 note was a manipulative act that increased the pressure on the delivery mechanism, and which was inconsistent with an intent to alleviate a squeeze on the June futures contract.

121. Under pressure from regulators, PIMCO lent out most (but not all on every day) of its holdings of the February, 2012 note. Throughout May and early June, PIMCO continued to lend the note, but crucially, the repurchase agreements it entered during this period required the counterparties to return the notes on or before 30 June, 2005—the last delivery day for the June contract. Therefore, its counterparties were obligated to return the notes to PIMCO prior to 30 June, and hence by adhering to these agreements, these counterparties would not be able to deliver these notes against futures. Thus, the repurchase agreements ensured that PIMCO's total claim against the February, 2012 note on or before the last delivery date remained above $4 billion.

122. If PIMCO had really intended its repurchase market activities to alleviate the delivery pressure on the June contract, it would have entered into repurchase

[50] Gross Dep., at 235-236. Zhu Dep. 1, at 87-88.

transactions with return dates subsequent to 30 June. The fact that it lent out only to 30 June clearly indicates that it had no intent of alleviating this pressure.

123. Note that as demonstrated at section VII infra, the structure of term repo rates indicated that the shortage of the February, 2012 note was expected to end on 30 June, 2005. PIMCO had this repo rate data in its possession. It was thus obvious to PIMCO that the source of the pressure on the repo market for the February, 2012 note, and on the June futures contract, was the acute potential for uneconomic deliveries on the June contract. Instead of alleviating this pressure by extending the delivery date on its repo transactions to beyond 30 June, or by reducing its futures positions, PIMCO consistently refused to lend the February, 2012 note beyond this date.

124. PIMCO has argued that its lending out of the CTD note on repurchase transactions shows that it was acting in a non-manipulative manner. In my opinion, this is incorrect. By structuring its repo positions to require its counterparties to deliver all the CTD notes they borrowed on 30 June, PIMCO did not alleviate or reduce the demand for the note on that date—the last date of delivery against futures. That is, its June 30 repos were economically equivalent to long forward/futures positions expiring on that date—just like the June 2005 futures contract. Therefore, the repo transactions did not reduce PIMCO's long position dated 30 June in a way that would have reduced the total demand for delivery of notes on that day; they just shifted its long from a spot position to a forward position expiring on the same day as its futures position.

125. Indeed, PIMCO's current defense is inconsistent with its understanding of market operations as described by Mr. Zhu. On 20 July, 2005, Mr. Zhu wrote the Investment Committee that "lehman repo trader confirmed today that they saw HF [hedge funds] with large position in 8/12 and 11/12, both in cash and term repo, (5bln each from several HF) against them, they have large shorts in 2/12, 8/11, 2/11, but mainly 2/12. The squeeze game in TYU and 8/12 may intensify in 2 weeks."[51]

126. That is, Mr. Zhu explicitly noted that hedge funds were able to accumulate large long positions through the term repo market, and that they hedge funds would try to squeeze the market. Thus, contrary to PIMCO's current representations, Mr. Zhu did not believe that holding a large long position in a security through the repo market—as PIMCO did in the February, 2012 note during May-June, 2005—was incompatible with a squeeze.

127. I agree with Mr. Zhu's analysis that a long repo position is a long position that, if large enough, can facilitate a squeeze. Indeed, I note that several well-researched squeezes in Treasury markets have involved the use of large long repo positions.[52] In my opinion, the large long repo position maturing on 30 June was complementary to PIMCO's large long futures position requiring delivery by that date, and that both positions contributed to PIMCO's market power and its ability to cause an artificial price.

128. In an 8 June, 2005 letter to PIMCO, the Chicago Board of Trade stated that it expected PIMCO to lend the February, 2012 note in the repo market through 30 June.

---

[51] Pl. Ex. 51.

[52] Bradford D. Jordan and Sarah D. Jordan, Salomon Brothers and the May 1991 Treasury Auction: Analysis of a Market Corner, 20 J. Bank. & Fin. (1996) 20. Bradford Cornell, Adverse Selection, Squeezes and the Bid-Ask Spread on Treasury Securities, 3 J. Fixed Income (1993) 39.

In my opinion, given the context of the letter—namely, its specific purpose of warning PIMCO against taking actions that could be deemed manipulative—the reasonable interpretation of lending "through" 30 June is that the return dates on the repo transactions should have fallen after this date, that is, after the last delivery date on the June futures contract. Instead, PIMCO lent out only to 30 June, an action that did not alleviate demand for the security on that date.

129. In public statements, representations to regulators, and testimony in this case, PIMCO has justified its conduct by asserting that the September futures contract was rich relative to the June, and that as a result it was (a) uneconomic for the firm to roll its positions into September, and (b) economic for the firm to stand for delivery on the June contract. This justification is wrong for a variety of reasons.

130. First, at times during May and June, 2005, per PIMCO's own calculations, the June contract was richer than, or only slightly cheaper than, the September futures (as measured by the spread relative to the swaps curve.) For instance, on 26 May, PIMCO calculated that the June futures swap spread was 50.3 basis points, whereas the September futures swap spread was 49.8 basis points. Since a wider swap spread indicates relative richness, on this date the June was cheap relative to the September. On June 8, again per PIMCO's own calculations, the June contract was only .2 basis points cheap relative to the September contract. Thus, on a swap spread basis the September and June contracts were very comparably priced for most of the period after 24 May.

131. Indeed, throughout the period the difference between the September and June swap spreads was smaller than the difference between the June and on-the-run swap

spreads. This means that if the September was so rich relative to the June that it was uneconomic for PIMCO to sell June contracts and buy September, it was even less economic for PIMCO to hold the June rather than buy additional quantities of the on-the-run note. That is, PIMCO can't have it both ways: if .2 basis points on a swap spread basis makes it uneconomic at the margin to sell June and buy September, an 8.1 basis point difference in the swap spread between the June futures and the on-the-run clearly makes it uneconomic to buy (hold) the former and not sell the latter.[53]

132. Second, as PIMCO itself acknowledged in a letter to the SEC, the profitability of the rolling into a rich September contract would have been unprofitable only if that richness eroded during the period in which it held that contract.[54] Specifically, PIMCO stated that rolling into the September contract "potentially riske[ed] losing on behalf of our clients $100 million if the September contract reverted to fair value."[55] That is, PIMCO's argument implicitly assumes that the September richness would dissipate over time.

---

[53] These swap spreads were calculated by PIMCO on 8 June, 2005. Email from Lori Hsu to Shailesh Gupta, Steve Rodosky, and Changhong Zhu, 8 June 2005.

[54] The profit from rolling a futures position is based on the price at which the next expiring contract is purchased and sold. The expiring position (June futures, in this case) will be closed regardless, either by taking delivery, or selling it, and hence the profit or loss on that position in no way depends on other actions that the holder takes. That is, when selling the June, the profit or loss on the June position does not depend on whether the holder buys September, or on-the-run notes, or does nothing; it depends only on the purchase and sales prices for that leg. The profit on the September leg of the roll is the difference between the sales price for September and the purchase price for that contract. If PIMCO bought the contract at fair price plus 1 unit of richness, and sold it for fair price plus 1 unit of richness, the profit or loss on this leg is the change in fair price. If PIMCO bought at fair price plus 1, and sold for fair price, the loss in richness would reduce its profit by 1 relative to the gain/loss on a fairly priced contract. Conversely, if PIMCO bought at fair price plus 1 unit of richness, and sold at fair price plus 2, the gain in richness would enhance the firm's profit by 1 unit relative to the gain/loss on a fairly priced contract. Therefore, the only difference between buying the rich contract, and buying a fairly price contract, is the change in richness over the holding period. No change in richness, no difference between buying a rich contract and buying a fairly priced one.

[55] Pl. Ex. 39. Emphasis added.

133. PIMCO has acknowledged that "[p]rofits are not realized from rolls and therefore PIMCO has no analysis or other records of such profits."[56] Therefore, it is not the differential between the richness of the June and September contracts that was relevant in determining the advisability of rolling into the September contract; instead, it was the anticipated course in the richness of the September contract over the contract's remaining life.

134. In essence, PIMCO's justification assumes that the September contract would revert to fair value. If this is true, why would not the same be true for the June?—in which case, per its own reasoning, it should have sold the June and bought other fairly priced or cheap instruments in order to capture the evanescent richness in the June.[57]

135. Third, long futures traders who did not have market power (that is, all but PIMCO) rolled into September contracts at a faster than normal pace during May, 2005.[58] If the September contract was uneconomically rich—as PIMCO contends—it would have been uneconomic for these other participants to liquidate June futures and buy September futures, or to buy September futures rather than other, cheaper instruments. But the whole market rolled ahead of schedule.

136. Only PIMCO had the market power to cause credibly the June contract to trade on the basis of the August note prices and reap a windfall profit. PIMCO manipulated to

---

[56] Objections and Responses to Plaintiff's Fifth Request for Production of Documents Directed to PIMCO LLC, at 5.

[57] Mr. Gross opined that the September was rich due to Asian investors' holding of the cheapest-to-deliver note for that contract; these investors would be unlikely to supply them to the delivery process. Mr. Zhu stated that the richness of the September, 2005 contract was due to (a) the small size of the CTD note, (b) the accumulation of large quantities of this note by hedge funds, and (c) the resulting potential for a squeeze in the September contract.

[58] Mr. Keller acknowledged this in a 25 May, 2005 email to William Lange of the Chicago Board of Trade and Elverse Alexander of the CFTC.

import the expensiveness of the August note into the June futures price. The richness of the September contract was attributable to the richness (relative to other instruments on a swap spread basis) of the August, 2012 note, which was CTD on the September contract. This note was the next cheapest-to-deliver against the June contract. Hence, the richer the August, 2012 note, the more profitable it was to cause the June contract to be priced off the threat that shorts would be forced to make uneconomic deliveries of this note on the June contract. Thus, the richness in the August, 2012 note, and the September futures contract, increased the profitability of manipulating the June contract, and increased the incentive of PIMCO to manipulate the June.

137. If PIMCO was merely responding to market price signals like any other participant, one would expect that other market participants would not have rolled into September either. Indeed, there should have been active attempts to sell the September contract to take advantage of its richness—and its expected fall; this attempted selling would have in fact moved the market towards fair value if market participants had indeed believed that the richness was transitory, and not driven by underlying market conditions that were expected to persist. This would have been reflected in a smaller than average, and later than average, rise in the open interest of the September contract during the roll period. This did not occur.

138. Put differently, PIMCO justified—and continues to justify—its conduct based on an interpretation of price and valuation information available to every moderately sophisticated Treasury futures market participant.[59] Its logic should therefore apply

[59] Indeed, in its 25 October, 2005 letter to the SEC PIMCO stated that "PIMCO has an asset swap spread model similar to most market participants." PIMCO's representations about the richness of the September contract were based on this asset swap spread model. Hence, it relied on information widely available to, and widely used by, market participants.

to every moderately sophisticated market participant, and hence every moderately sophisticated market participant should have behaved similarly to PIMCO by eschewing purchases of the September and holding onto the June. Yet this did not happen. PIMCO behaved quite differently than other market participants. As indicated by its continuously rising fraction of the June open interest, PIMCO held June and stayed out of September, whereas other market participants were selling June and rolling into September. PIMCO has produced no evidence that it possessed special information not readily available to the market, nor have its decision makers testified that they based their decisions on information not readily available to the market. This demonstrates that the motives underlying their trading activities were not those of a competitive, commercial participant; if they were, they would have acted like the other competitive market participants who bought September futures in amounts and on a pace observed during other contract rolls.

139. Therefore, PIMCO's justification for its conduct is logically inconsistent, inconsistent with its own analysis of the pricing structure in the Treasury market, and inconsistent with the actions of other market participants. Logical consistency requires that if September was rich relative to June, June was much richer relative to other instruments that PIMCO could have purchased. Hence, even if one agrees that PIMCO should not have bought September contracts because they were rich relative to June, one must immediately conclude it should not have held June contracts instead of other instruments (notably, on-the-run Treasuries) that were by its own estimation even cheaper relative to June than was June relative to September. Moreover, the profit or loss on the September contract depended not on its relation to June, but how

the September futures price changed over time; based on PIMCO's analysis of market conditions in May-June, 2005, there is no reason to believe that the putative richness in the September contract would dissipate over time. Indeed, it believed that futures would remain persistently rich. Lastly, PIMCO was observing the same information as all other market participants—yet those other market participants did not find September so rich and June so cheap that they held the latter and eschewed buying the former.

140. In my opinion, PIMCO's failure to liquidate June, 2005 Ten Year Treasury Note futures through rolls into the September contract, or purchases of instruments other than the CTD, was a manipulative act designed to import the richness of the August, 2012 note and September futures prices into the June futures price.

VII. ARTIFICIALITY

141. The main evidence of manipulation is distortion of the futures price and the price(s) of instruments deliverable against the futures contract ("the deliverables") relative to the prices of other, comparable instruments. These can include the prices of other instruments not deliverable against futures, instruments that are deliverable but only at a substantial, adverse price differential, and the prices of other futures contracts, such as contracts for later delivery or contracts on related instruments.

142. In the Treasury note futures market, a long market power manipulation distorts the relationship of the futures price relative to, inter alia: (a) the price of the security that is cheapest-to-deliver against futures, and (b) the prices of other Treasury securities, including the cash prices of "on-the-run" Treasury securities. Moreover, a long market power manipulation distorts the relationship of the price of the cheapest-to-deliver security relative to the prices of other Treasury securities.

143. The prices of fixed income securities vary inversely to their yields. Given that Treasury securities can have different maturities and coupons that can cause their prices to differ even when yields are the same, it is conventional to compare yields on fixed income securities. That is, yields are more directly and easily comparable than prices.

144. To control for the effect of the shape of the term structure on yield relationships, it is also common in Treasury markets to: (a) take the difference between a given Treasury yield and the prevailing rate on a "swap" with an identical maturity, and (b) compare these "swap yield differentials" across different Treasury securities.[60] PIMCO utilized this methodology to evaluate the relative prices of different Treasury securities. PIMCO has asserted that this is a common methodology in the Treasury markets. I agree with this assessment.

145. To evaluate whether the relationship between the futures price and the price of the cheapest-to-deliver note on a given futures contract is distorted, I compute the "basis net of carry" ("BNOC") for the note that is cheapest to deliver against the futures contract. The Ten Year Treasury Note futures contract permits shorts to deliver any Treasury note with between 6.5 and 10 years to delivery. Upon delivery, the short receives an "invoice amount" which equals the note's conversion factor times the futures price at the time of delivery plus the accrued interest on the note. The basis net of carry for a particular note is the difference between (a) the price of the note, plus the cost of financing it to delivery (net of any coupon income received on the

[60] A "swap" is a contract to exchange cash flows between two parties. In a "vanilla" interest rate swap, one party makes "floating" payments over the life of the contract, where these payments vary with some short term interest rate, usually LIBOR. The other party makes a fixed payment that is negotiated between the parties at the initiation of the agreement. The fixed rate (the "swap rate" or "swap yield") is the par yield on a bond.

note prior to delivery) and (b) the invoice price of the future calculated based on the current futures price.[61] The basis net of carry represents the dollar amount that can be realized (with certainty) upon delivery by (a) purchasing the deliverable security and financing it until delivery, and (b) selling futures as a hedge. The cheapest to deliver security is the one with the highest basis net of carry.[62]

146. In an efficient, undistorted, and competitive market for Treasury futures, basic finance theory (based on the absence of arbitrage) implies that the futures price should be *less than* (a) the full price of the CTD note multiplied by the cost of financing the note from the current date to delivery, (b) minus any coupon payments made on the CTD note prior to delivery, (c) minus the accrued interest of the CTD note at delivery, (d) all divided by the conversion factor on the CTD note. The futures price should be less than the amount implied by this formula because shorts have the option to deliver one of several notes. If the cheapest to deliver note changes prior to delivery, shorts can sell the old CTD, buy the new CTD, and capture the price difference as a profit. This delivery option—referred to as the "quality" or "switch" option—is valuable to shorts, who therefore bid down the futures price to below the cost of buying the current CTD and financing it to delivery.[63] Moreover, shorts possess other options, including the "wildcard" and end-of-month options, both of which tend to depress the futures price relative to the forward price of the CTD, and hence contribute to a positive BNOC.

---

[61] The invoice price is the product of a conversion factor and the futures price, plus accrued interest at time of delivery. Each note has its own conversion factor. The conversion factor equals the "clean" price of one dollar in principal amount of the bond as of the first day of the delivery month, assuming that the bond yields 6 percent to maturity. In implementing this formula, the time to maturity of the security is rounded to the nearest quarter of a year.

[62] For a detailed analysis of the net basis, see Galen Burghardt, Terrence M. Belton, Morton Lane, and John Papa, The Treasury Bond Basis (2005).

[63] I have attached a primer on Treasury arbitrage and the BNOC as Exhibit 11.

147. That is, the BNOC should be positive in a competitive market. A persistently negative BNOC is symptomatic of a manipulative price distortion; it measures an artificial elevation of the futures price relative to the price of the CTD. A negative BNOC implies that there is a positive probability that shorts will be forced to deliver a non-CTD security. This would not occur in a competitive market. Such "inefficient deliveries" are the sine qua non of market power manipulation.[64]

148. To evaluate whether the futures price is distorted relative to the prices of other Treasury securities, and whether the price of the CTD note is distorted relative to the prices of other Treasury securities, I compare swap spread yields. Specifically, to examine the possibility of distortion in the futures price, I compare the "forward swap spread yield" implied by the Treasury note futures price to the swap spread yields for the five year and ten year on-the-run Treasury securities. I compute the forward swap spread yield by determining the yield to maturity of the CTD note as of the last delivery date, using the invoice price implied by each day's futures price as the price in the yield formula. Similarly, to test for artificiality in the price of the CTD, I compare the swap spread for the CTD note to the swap spreads for the five and ten year on-the-runs. I utilize these on-the-run securities because they are the most liquid Treasury instruments available, and their maturities bracket those of the CTD note.

[64] Burghardt et al, supra note 62, and John J. Merrick, N. Y. Naik, and P. K. Yadav, Strategic Trading Behavior and Price Distortion in a Manipulated Market: Anatomy of a Squeeze, 77 J. Fin. Econ. (2005) 171, determine the implied probability of inefficient deliveries from the BNOC. PIMCO personnel made similar calculations. Moreover, market commentary from May-June, 2005 also routinely interpreted the negative BNOC as evidence that inefficient deliveries were likely. Although Treasury futures contracts permit the short to choose to deliver one of several instruments, in competitive market conditions this means that only a single security should be delivered at a given time, but that the identity of the security that is delivered may change from day-to-day, and is not known with certainty prior to expiration. In contrast, delivery of two different securities at the same time, one of which is substantially richer in value than the other, would not occur in a competitive market, and is symptomatic of market manipulation.

149. Butterfly spreads represent another measure of the distortion of price of a particular note (e.g., the CTD) relative to the prices of related securities. In particular, I calculate a butterfly spread equal to the difference between (a) a duration weighted average of the yield on a security with a maturity longer than the CTD note (the August, 2013 note) and a note with a maturity shorter than the CTD note (the August, 2011), and (b) the yield on the CTD note. A large increase in this spread value indicates a large change in the price relationship between closely-related securities; a manipulation tends to cause such a large change in the price relationship.

150. "Special" repurchase rates are also indicia of price artificiality. Market participants can borrow money collateralized by Treasury securities through "repurchase" (or "repo") transactions. Most repo trades are secured by "general collateral," and the rates on such loans are referred to as "general collateral" (or "GC") rates. Under these agreements, the borrower of dollars can supply any security of the agreed upon credit quality (e.g., US Treasury securities) as collateral; the lender returns this same collateral. Some repos are collateralized by a particular security. Whereas the borrower under a GC loan can provide collateral of equal value to the lender using any security of the agreed upon credit quality, in a "specific collateral" transaction the borrower supplies as collateral a specific security (e.g, the February, 2012 note) agreed to by the parties to the transaction. The interest rate on such specific collateral repos is typically lower than the GC rate. This difference is referred to as "specialness," and securities that can be used as collateral to borrow at below-GC rates are referred to as being "on special." Special repo rates indicate a shortage in the underlying note.

151. One possible source of a shortage is a long manipulation, which raises the demand for the CTD note.[65] Therefore, specialness of the CTD note is a signal of manipulation. This is especially the case when the specialness is anticipated to end after the note is no longer needed for delivery against futures. This can be determined by estimating the forward repo rate for the period beginning on the last delivery date, and ending some time thereafter.

152. A special repo rate elevates the price of the underlying security because the owner of that security can use it as collateral to borrow at below-market interest rates. The amount of specialness can be used to estimate the inflation in the price of this security.[66]

153. Futures markets are forward looking. Price distortions can appear prior to the delivery period. Price distortions appear when market participants assess that there is a positive probability of a market power manipulation. The magnitude of the price distortion is greater, the higher market participants' assessment of the likelihood and the greater their assessment of the severity of a market power manipulation.

154. All of the indicia of price artificiality were present in the class period. In particular: (a) the BNOC was negative by unprecedented amounts; (b) by historical standards, the forward swap spread was wide compared to that for five year and ten year on-the-run T-notes; (c) the butterfly spread widened dramatically; (c) by historical standards, the CTD swap spread was wide compared to the swap spreads

---

[65] Specialness can also occur in a competitive market. Specifically, some newly issued ("on-the-run") securities trade special. This is most likely attributable to the high liquidity of these notes. Darrell Duffie, Special Repo Rates, 51 J. Fin. (1996) 493. Specialness in competitive markets should not arise for this reason for older, less liquid securities.

[66] Bradford D. Jordan, and Susan D. Jordan, Special Repo Rates: An Empirical Analysis, 52 J. of Fin. (1997) 2051.

for five year and ten year on-the-run T-notes; and (e) the CTD note was trading special.

155. The amount of artificiality was largest in the period 20-25 May, 2005, and 6-10 June, 2005. Although the amount of artificiality was largest during these periods, it was present throughout the class period.

156. Exhibit 2 presents evidence on the BNOC. So that the figure associates artificially high futures prices with high points on the graph, the figure depicts the June, 2005 Ten Year Treasury Note Futures BNOC multiplied by minus one. Thus, positive numbers in the figure are associated with negative values of the BNOC, and hence indicate an elevation in the futures price relative to the price of the CTD. There are multiple lines in the figure, each corresponding to different sources of repo rate data for the CTD security (the February, 2012 note.)

157. In a competitive market, the points in the figure should all lie at zero or below. However, all points in the figure lie above zero. The figure demonstrates that the June futures price was higher than one would expect in a by as much as 15/32's (on 24 May), and was 8/32's too high for almost the entire 20 May-10 June period.

158. This large negative BNOC was highly anomalous. PIMCO's daily futures valuation reports record this value beginning in June, 2002. From June, 2002-March, 2005 (inclusive), the BNOC averaged 3.81, and was negative a total of 80 times.[67] Even when the value of the BNOC was negative, it was close to zero. The BNOC during this period was no smaller than -2.2, and achieved this value only twice; when the BNOC was negative, it averaged -.511.

[67] PIMCO did not provide plaintiffs with reports for the period 24 August, 2004-29 October, 2004. In addition to this block of missing reports, PIMCO did not provide reports for scattered days throughout the 2002-2005 period. I reserve the right to revise this report if I obtain additional reports.

159. During March, 2005, Stanley Jonas of FIMAT emailed Mr. Zhu, stating that "THIS TIME THE [March, 2005] TEN YEAR NOTE FUTURES IS BEING SQUEEZED."[68] At this time, the BNOC was around -2. During the class period, the BNOC was almost always greater than -2 (in absolute value). Thus, (a) even a -2 BNOC was considered by market participants to be a squeeze, and (b) the June futures BNOC was far wider than -2 for most of the class period.

160. Relatedly, PIMCO calculated the "richness" and "cheapness" of the Ten Year Treasury futures contract. This calculation adjusted the BNOC to reflect the value of the delivery options mentioned supra. A contract is rich (i.e., overpriced) when the option adjusted BNOC is negative, and is cheap when the option adjusted BNOC is positive. From January, 2002 through March, 2005, the average adjusted BNOC was .97, i.e., on average the contract was cheap. During this period, the contract was rich on only 138 days. The average richeness during this period was .59. The maximum richness was 4.

161. In contrast, during the class period, the contract was rich on an option adjusted basis by as much as 13.2, and was rich by at least 4 from 20 May, 2005 through the end of the class period. Thus, based on PIMCO's own calculations that it utilized for trading purposes, the June Ten Year contract was extremely rich during the class period. Indeed, PIMCO employees have testified that the richness was unprecedented.[69]

---

[68] Email from FIMATUSA@bloomberg.net|Stanle Jonas| to Changong@bloomberg.net|Changhong Zhu|, 3/16/2005, 7:51:50.

[69] Rodosky Dep. 1, at 127-128. Keller Dep. 1, at 233. Schulist Dep., at 46. Hsu Dep., at 46. Dialynas Dep., at 81.

162. The PIMCO futures valuation reports I have reviewed also demonstrate that richness of this magnitude had not been observed in any other Treasury futures contract, including the Two Year Note futures, the Five Year Note futures, and the Treasury Bond futures.

163. Exhibit 3 presents the butterfly spread from 3 January, 2005-1 July, 2005. Note that the spread rises dramatically beginning around 20 May, and reaches a peak on 24 May. PIMCO bought large quantities of the CTD note during this period. This movement in the butterfly spread indicates that the value of the CTD note changed dramatically relative to the values of closely related notes during the class period in a way that is consistent with manipulative artificiality. Moreover, the butterfly spread value deviates from its pre-class period value by a statistically significant amount on several days during the class period.

164. I have implemented an econometric analysis to evaluate the relationship between the forward swap spread and the forward swap spreads on five and ten year on-the-run Treasury securities. Specifically, I regressed the forward swap spread against the forward swap spread for the five and ten year on-the-run notes.[70] The sample period in these regressions is 3 January, 2000-21 June, 2005, a period encompassing 22 different futures contracts. The regressions also include dummy variables for each of the different contract months, and separate dummy variables for each day of the class

[70] Swap yields are commonly quoted for maturities of one through thirty years in intervals of one year up through twenty years to maturity. That is, swap yields are quoted for integer maturities. Since the maturities of the CTD note and the on-the-run securities are almost always never exactly an integer it is necessary to interpolate the swap curve in order to derive a swap yield for a maturity corresponding exactly to the maturity of the instrument of interest. I utilize a non-parametric kernel regression technique to fit a swap curve as a function of maturity. For a review of these techniques, see Adrian Pagan and Aman Ullah, Nonparametric Econometrics (1999). I then use cubic spline interpolation to determine a fitted swap yield for a maturity corresponding exactly to the maturity of the instrument of interest.

period.[71] The estimated coefficients of the class period dummies provide an estimate of the amount of artificiality (measured in basis points) on each day of the class period.

165. Exhibit 4 presents a table of the estimated artificiality in the settlement price (measured in dollars) at the end of each trading day, and *p*-values that estimate the probability that these estimates would be observed by chance in a competitive market.[72] Note that the estimates of the artificiality are all positive, and exhibit a pattern similar to that found for the BNOC, with peaks around 24 May and 8 June. Moreover, the *p*-values indicate that these values were unlikely to have occurred by chance in a competitive market, and that some values were extremely unlikely to have occurred by chance in a competitive market. Indeed, the *p*-values for all the coefficients for the period 20 May-10 June are all significant at conventional levels of significance.

166. The estimates of artificiality derived from the econometric methodology are not statistically different (at conventional levels of significance) from the sum of the

[71] One would expect that the forward swap yields and the on-the-run swap yields are cointegrated, and the data indeed confirm this. I utilized a Dynamic Ordinary Least Squares Estimator, as is appropriate for cointegrated time series. James A. Stock and Mark W. Watson, A Simple Estimator of Cointegrating Vectors in Higher Order Integrated Systems, 61 Econometrica (1993) 783. Fumio Hayashi, Econometrics (2000). James D. Hamilton, Time Series Analysis (1994). The coefficient estimates are superconsistent. The inclusion of separate dummy variables for each contract essentially permits the difference between the forward swap yield and a linear combination of the five and ten year on-the-run swap yields to revert to a time-varying mean.

[72] In order to address issues related to the finite sample properties of the estimators, I calculated the p-values using a Monte Carlo simulation methodology. Specifically, I estimated the regression for a sample period ending the day before the commencement of the class period. Since the residuals are autocorrelated (as is expected with cointegrated time series), I estimated a residual autocorrelation regression. Using the parameters of this regression, I then simulated 10,000 paths of the residuals over the class period, and added these to the values predicted during the class period based on (a) the estimated coefficients, and (b) the values of the independent variables in the regression during the class period. This generated 10,000 samples of futures prices each beginning of 3 January, 2000 and ending on 21 June, 2005 under the null of no artificiality. I then estimated the regression for each of these 10,000 simulated samples. The p-values are the fraction of the simulated coefficient estimates that fall below those estimated for the actual data up through 21 June, 2005.

artificiality produced by the sum of the BNOC and the price distortion in February, 2012 note implied by the distortion in the butterfly spread. Thus, these two very different approaches produce statistically indistinguishable measures of price artificiality.

167. I repeated this exercise for the CTD security. In the regression, the dependent variable is the swap spread on the Treasury note with the maturity closest to 6.75 years, the approximate maturity on the February, 2012 note during May-June, 2005.

168. The results of these artificiality estimates are presented in Exhibit 5. Again, almost all of these estimates are positive, and reach a peak around 24 May. The artificiality estimates around 24 May are all statistically significant at conventional levels. The artificiality estimates are statistically significant at conventional levels from 20 May-10 June.

169. In a market unaffected by the exercise of market power, or the anticipation thereof, one would expect forward swap spreads to be less than the swap yields of on-the-run Treasuries, due to (a) the superior liquidity of the on-the-run issues, which causes them to sell at a higher price/lower yield than the CTD issue that is a primary determinant of the forward yield, and (b) the delivery options on the futures contract, which tends to depress the futures price, and hence elevate the forward yield. Moreover, one would expect the CTD swap spread to be smaller than the swap spreads of the on-the-run issues due to the superior liquidity of the latter. Indeed, this was observed for virtually the entire 2000-2005 period. However, during May-June, the forward and CTD swap spreads were persistently larger than the on-the-run

spreads. In my opinion, this was highly anomalous, inconsistent with the normal operation of a competitive market, and symptomatic of manipulative price distortion.

170. PIMCO's own data confirms this. During January, 2002-March, 2005, PIMCO estimated the swap spread for the futures averaged 39.8 basis points, whereas the on-the-run security swap spread averaged 45.6 basis points. In contrast, during the class period, the swap spread on the June futures note averaged 50 basis points, whereas the on-the-run swap spread averaged only 46 basis points. This represents an almost 10 basis point change in the relationship between the futures and on-the-run swap spreads. In my opinion, there was no fundamental economic reason for this relationship to change during May-June, 2005. It is entirely consistent with distortion and artificiality in the futures price, and is not explained by other developments during the class period.

171. The February, 2012 was "on special" throughout the class period, especially in the period beginning 20 May. Exhibit 6 depicts the amount of specialness by day. This provides further evidence of price artificiality, and of an anticipated shortage in the CTD note. That is, the market was anticipating that the available supply of the February, 2012 note would be insufficient to meet the demand for deliveries on the June contract.

172. Moreover, it is evident that the shortage was anticipated to end on 30 June—the last delivery day of the June contract. Exhibit 7 depicts the repo rate on the February, 2012 for two different terms, one ending on 30 June, the other on 30 September. Note that the 30 September rate is uniformly above the 30 June rate, and that the gap between the two widens substantially on about 20 May, 2005. Moreover, a

comparison of the 30 September rate for the February, 2012 note with the 30 September rates for other securities indicates that the February, 2012 note rate was actually somewhat higher, whereas a comparison of the 30 June term rates indicates that the February, 2012 note rate was substantially lower. Thus, the market did not anticipate a shortage of the note post-June, 30, but did anticipate an acute shortage of the note for the period ending 30 June—the last delivery day on the June contract.

173. This magnitude and persistence of the specialness for the CTD note was unprecedented for at least the 2002-2005 period. I have reviewed PIMCO's daily futures pricing analysis reports that record the relevant term repo rate for the CTD security on each day beginning in January, 2002; the relevant term repo rate is for repos that mature on the last day of the delivery month. I have compared this to another commonly used funding rate, the LIBOR rate (a comparison that PIMCO also employed.) From January, 2002-March, 2005, the term repo rate on the CTD security averaged 32 basis points below LIBOR, and the term rate averaged 78 percent of LIBOR. In contrast, during May-June, 2005, the term repo rate on the February, 2012 note was routinely 200 basis points special. During the class period, the difference between LIBOR and the 30 June, 2005 term repo rate on the February, 2012 note averaged 214 basis points, and the term rate was only 32 percent of the LIBOR rate.

174. This specialness implies an inflation in the price of the February, 2012 note. Exhibit 8 depicts the amount of distortion (in 32nd's) implied by the special repo rate. The pattern exhibited in this figure is consonant with the patterns exhibited in Exhibits 3 and 6.

175. In sum, the BNOC, swap spreads, and repo rates all provide evidence that the prices of the June futures contract, and the CTD note, were artificially inflated during the class period. Moreover, all of this evidence presents a consistent picture of the evolution of this price artificiality over the class period.

176. PIMCO's own analysis is consistent with that I have presented here. That is, PIMCO determined that the June contract was rich relative to the CTD by an extreme amount; that the relevant term repo rate was extremely special; and that the forward swap spread was wide compared to the swap spread for on-the-run Treasury notes.

177. In my opinion, the analysis of the swap spread data provides compelling statistical evidence of distortions during the class period. There are some days, however, for which the *p*-values, though high, are somewhat below conventional levels of statistical significance. It should be noted that these *p*-values condition only on the historical data used in the estimation. However, there are other data that should be considered. Specifically, the BNOC and the specialness of the repo rate on the February, 2012 notes provide valuable information that supports the artificiality estimates derived from the historical data. Fundamental economic considerations, rather than statistical inference, imply that a negative BNOC and the observed pattern of repo specialness are patently inconsistent with competitive pricing in a Treasury futures market. Indeed, these different measures of artificiality are statistically indistinguishable. Therefore, in my opinion, this additional information also implies that the probability that the artificiality estimated from the historical data was even less likely to have resulted by chance in a competitive marketplace than the p-values would suggest. Thus, in my further opinion, the probability that the regression

estimates of artificiality resulted from chance occurrences in competitive Treasury futures and cash market is substantially smaller than the *p*-values.

178. I have reviewed the artificiality methodology and estimates produced by Plaintiffs' expert Dr. John Merrick. In my opinion, these methodologies are economically rigorous, make valid comparisons of price relationships to determine artificiality, and are implemented properly. Moreover, in my opinion, Dr. Merrick's methods and results are complementary to those I present supra, and reinforce strongly my conclusions that (a) the prices of the June, 2005 Treasury Note futures contract and the February, 2012 Treasury note were artificial throughout the class period, and (b) this artificiality was highly unlikely to have resulted from chance in a competitive market.

179. In sum, there is compelling evidence that the price of the June, 2005 Ten Year Treasury note futures contract was artificially high during the class period. The negative BNOC, and the persistent specialness in the term repo market for the CTD note, are both inconsistent with competitive pricing in this market. Moreover, the magnitude of the basis distortion, and the amount of the specialness, are extremely large relative to that experienced in the nearly three and one-half years prior to the expiry of the June contract. Furthermore, the forward swap spread and the swap spread on the CTD were both large compared to the swap spreads on on-the-run Treasuries. Similarly, the butterfly spread indicates that the CTD was rich during the class period. All of this evidence points to large, persistent, and economically and statistically significant artificiality in the price of the June Treasury Note futures contract.

VIII. DAMAGES

180. Based on the price data and models described supra, I have made an estimate of the daily artificiality in the price of the June, 2005 Ten Year futures price. I have also developed and implemented a methodology to estimate that artificiality on a minute-by-minute basis during the class period. I combine this information with data on trading activity in the market to construct a conservative estimate of the losses suffered by class members during the class period due to the artificiality in the June futures price.

181. The methodology I have developed can be utilized to estimate the artificiality-induced losses of each class member on an individualized basis. Inasmuch as the methodology permits the determination of artificiality intra-day, when estimating artificiality-induced losses it can take into account the precise timing of each class member's purchases and sales.

182. Given the data currently available, I can construct a conservative estimate of damages suffered by all class members.

183. To make this estimate, I assume that (a) the decline in open interest on a given day measures the number of contracts liquidated by shorts during that day, and (b) contracts are liquidated at the volume-weighted average of artificiality realized throughout the day, where artificiality is estimated based on the econometric analysis described supra. To calculate damages on a given day, I multiply the change in open interest (if negative) on that day by minus one by the volume-weighted average of artificiality set out in Exhibit 9.

184. The minute-by-minute estimate of artificiality is constructed as follows.

185. First, using transactions data from the eSpeed trading system, I estimate the average price of the on-the-run five ("OTR") year and ten year Treasury notes during intervals centered on each minute from 7:20 AM to 2:00 PM Central Time. I use these prices to determine the forward yield on the OTR five year and ten year notes from the 30 June, 2005 forward date.

186. Second, I determine average Eurodollar futures transactions prices from trades conducted on the Chicago Mercantile Exchange's floor and its Globex Electronic trading system for contracts with maturities from June, 2005-March, 2015 for intervals centered on each minute from 7:20 AM to 2:00 PM Central Time. Employing standard financial valuation formulae, I use these prices to determine minute-by-minute forward swap rates from the 30 June, 2005 forward date and maturities equal to those of the OTR five year and ten year notes. These swap rates adjust for convexity bias in Eurodollar futures prices using information from ICAP/GovPx.[73]

187. Third, I take the difference between the forward swap yields and the corresponding OTR yields to calculate forward five year and ten year swap spreads.

188. Fourth, using the coefficients derived from the econometric model described supra, I calculate a predicted forward swap spread for the June, 2005 Treasury Note futures contract. This predicted forward swap spread is the swap spread that is expected to prevail (conditional on the five year and ten year OTR swap spreads) but for manipulation of the June contract.

[73] Galen Burghardt and Bill Hoskins, A Question of Bias, 8 Risk (1995) 63 first identified convexity bias. See also Galen Burghardt, The Eurodollar Futures and Options Handbook (2003). For a detailed analysis of the necessary adjustments, see Philip Hunt and Joanne Kennedy, Financial Derivatives in Theory and Practice (2004).

189. Fifth, using the Eurodollar futures data, I estimate a forward swap rate from the 30 June, 2005 forward date to the maturity of the February, 2012 note. I subtract the predicted forward swap spread from this forward swap rate to derive a predicted forward yield on the June 2005 Treasury Note futures contract. This is the forward yield that is predicted to prevail (conditional on the five year and ten year OTR swap spreads) but for manipulation of the June contract.

190. Sixth, I input this predicted forward yield into the standard bond pricing formula for the February, 2012 note to derive a predicted forward price (from the 30 June, 2005 forward date). I divide this forward price (net of accrued interest on 30 June, 2005) by the conversion factor for the February, 2012 note to derive a predicted June futures price. This is the futures price that is predicted to prevail (conditional on the five year and ten year OTR swap spreads) but for manipulation of the June contract.

191. I subtract the predicted futures price from the observed price for each minute. This produces an estimate of the artificiality of the June contract for every minute in the class period.

192. Market participants liquidate contracts throughout each trading day. The volume of all transactions executed electronically on the Chicago Board of Trade is reported in the exchange's Time & Sales records.[74] I utilize this data to determine the volume of electronic trade in the June contract in each minute of the class period. Using these volume records and the minute-by-minute measure of artificiality, I calculate the volume weighted average of artificiality during each day of the class period. This represents a measure of the average artificiality paid by purchasers of June, 2005 Treasury Note futures contracts on each day of the class period.

[74] Volumes of floor trades are not included in the Time & Sales record.

193. I multiply this average artificiality on each day of the class period by minus one times the change in the open interest (if negative) on that day. In my opinion, most of the decline in open interest on a given day during the class period represents liquidation of positions. Thus, this product represents a measure of the amount of artificiality that shorts paid upon liquidating their positions.

194. This is an extremely conservative measure of damages because it excludes manipulative damages suffered by traders who opened and closed positions within a given trading day. Moreover, there are some days during the class period when open interest increases. In my opinion, it is almost certain that some shorts liquidated positions on these days. This calculation does not capture damages suffered by these shorts.

195. This conservative measure of damages implies that class members suffered a loss of $612 million as a result of the artificiality in the June, 2005 Treasury Note futures price. Exhibit 10 presents the damage estimates for each day produced by this methodology.

196. High frequency transaction data are inherently subject to some noise. Balancing this considerations and others, in my opinion the best measure of artificiality in this case is an average across the day (weighted by transaction volume) of the artificiality estimated from the high frequency data from within the day. The averaging mitigates the impact of any noise in the data. Furthermore, this method properly accounts for persistent actions, such as a refusal to liquidate positions. By averaging across shorter periods within those few days during the class period in which artificiality

changed substantially intraday, this method can take into account the impact of acts that would be expected to affect artificiality.

197. I note that the method implemented herein is capable of determining the damages suffered by each trader—including those who opened and closed positions within a given trading day. That is, in Claims Administration, class members can submit their records of purchases and sales. Given these records, and the methodology described supra, it is possible to determine the artificiality paid by each class member on all transactions, including those opened and closed within the trading day.

IX. CAUSATION

198. A market power manipulation of a futures contract requires that the supply curve of the deliverable slope upwards.[75] That is, over some range of deliveries, increasing the quantity of the commodity or security delivered requires an increase in the price of the future. Moreover, the price impact of a given quantity of deliveries is greater, the steeper this supply curve.

199. In the Treasury note futures market, there are at least two factors that can cause the supply curve to slope upwards.

200. First, the supply of the CTD security may be upward sloping. That is, over some range of deliveries, additional quantities of the CTD note are made available for delivery only in response to increases in the futures price. The CTD note supply can be upward sloping because of differences in transactions costs across holders of the security.[76] Although some holders of the security can readily make it available for delivery at low transactions cost, due to institutional, legal, or economic barriers,

[75] A market power manipulation is sometimes referred to as "a corner" or "a squeeze." I use these terms infra to mean the exercise of market power by the holder of a large long futures, forward, or cash position.
[76] Duffie, supra note 65, at 507-509.

others incur larger transactions costs. These holders will make the note available for delivery only if the futures price rises sufficiently to compensate them for the transactions costs they incur to do so. Any dispersion in transactions costs across holders of the CTD note induces an upward slope in the supply of this security.

201. PIMCO decision makers recognized that some holders of Treasury notes incurred transactions costs to make these notes available for delivery. For instance, Mr Gross stated that the supply of "deliverable collateral has really shrunk due to Asian purchases and the like."[77] Mr. Keller testified that foreign central banks often do not release their holdings of US Treasury securities to the market.[78] Mr. Gross's and Mr. Keller's analyses were echoed by other market participants, one stating that "foreign accounts own many of the . . . 2/12s which usually end up being 'put away."[79] Mr. Zhu and others in PIMCO discussed the "float" of the February 2012 CTD note, and concluded that the supply of this security that would be available for delivery was smaller than the total amount of the security outstanding. Thus, the relevant decision makers and PIMCO were clearly cognizant of the fact that some holders of the CTD note incurred transactions costs to make these notes available for delivery; that there was dispersion in these transactions costs across holders; and hence that the supply curve of the CTD note was upward sloping.

202. Second, disparities in the costs of delivering different notes against futures contribute to an upward sloping supply curve. The Chicago Board of Trade determines the amount paid to a short upon delivery using an invoice price formula.

---

[77] Michael Mackenzie, Treasury Settlement Problems May Get Worse Before Better, Wall Street Journal, 10 August, 2005.
[78] Cite to Keller depo.
[79] Pl. Ex. 33.

Upon delivery of note *X*, the short receives an invoice price equal to a conversion factor for note *X* multiplied by the futures price, plus the accrued interest on note *X*. Each note has a different conversion factor; this conversion factor equals the price of $1 in principal amount of the note on the first day of the delivery month, assuming that the bond earns a yield of 6 percent to maturity. Due to differences in coupon and maturity across deliverable notes, the profit from delivery (measured as the difference between invoice price and the price of the note), differs across notes. The difference between the delivery profit from the CTD note and the next-CTD note represents a cost of delivering the next-CTD note, and contributes to an upward sloping supply curve.[80]

203. The disparities in delivery cost depend on a variety of factors, including the shape and level of the term structure of yields, and the durations of the deliverable securities.[81] In a flat term structure environment, the lowest (highest) duration security is cheapest-to-deliver when yields are below (above) 6 percent. In a flat term structure environment with yields well below 6 percent, the lowest duration security can be substantially cheaper to deliver than the security with the next lowest duration.

204. The disparity between the cost of delivering the CTD note (the February, 2012) and the next-CTD note (the August, 2012) was very large during May-June, 2005 because (a) the term structure was flat, and (b) yields were well below 6 percent.

205. By forcing delivery of non-cheapest-to-deliver notes, a large long receives a windfall. The value of this windfall is equal to the difference between the net basis of

[80] Models that show how disparities in the values of deliverables make manipulation possible include Albert Kyle, A Theory of Futures Market Manipulations, in R. Anderson, ed., The Industrial Organization of Futures Markets (1984), and Pirrong, supra note 2.

[81] Duration is a measure of the sensitivity of a security's price to interest rate changes. The larger the duration, the larger a percentage change in price for a given change in interest rates.

the next-CTD note and the net basis of the CTD note. Since by definition the CTD note is the one with the lowest net basis, it is more profitable for a long to receive delivery of non-CTD notes.

206. PIMCO was acutely aware of the disparity between the cost of delivering the CTD and next-CTD notes. Indeed, Mr. Keller specifically stated that receiving non-CTD notes would represent "a windfall" for PIMCO.[82]

207. Market participants were also acutely aware of this disparity.

208. Therefore, in my opinion, the supply of deliverable securities for the June, 2005 Treasury Note Futures contract was upward sloping. This is a necessary condition for a manipulation to occur.

209. The likelihood of receiving non-CTD notes depends on the number of deliveries taken, and the readily available supply of CTD securities. Since as noted supra some owners of CTD notes incur transactions costs to make these securities available for delivery, the readily available supply of CTD notes for delivery is less than the total amount of this issue outstanding (which was $25.4 billion for the February, 2012 note). This readily available supply is sometimes referred to as the "float" or the "available supply." Market participants attempt to estimate the available supply. Published estimates of the float of the CTD note for the June, 2005 contract were in the range of $15 billion.

210. James Luxem of J. P. Morgan estimated that the market could deliver "up to 15 billion of Feb 12s. This is larger than the free float in the issue and larger than what was delivered in March, but in extreme situations, it is likely that the market will find

[82] Pl. Ex. 37.

additional supply currently held in portfolios."[83] Luxem opined that deliveries beyond $15 billion would result in large price impacts. Mallory Brooks of Morgan-Stanley also estimated the float at $15 billion.[84] These analyses imply that a market participant who held more than $18 billion in the CTD (either outright or in the repo market) and long futures could cause the June contract to trade at artificial prices.

211. Mr. Gross has publicly acknowledged that economic factors constrain the float of a deliverable security. PIMCO's position was large relative to prevailing estimates of the float of the CTD note.

212. If the amount of deliveries demanded exceeds the supply of the CTD security available at a premium above the competitive price that is less than the net basis difference between the CTD and the non-CTD, deliveries of the non-CTD will occur.

213. In my opinion, deliveries of the non-CTD are economically inefficient and manipulative. Moreover, the futures price is artificially high when inefficient deliveries occur.

214. Although deliveries of the non-CTD represent a sufficient condition for an artificial price, they are not a necessary condition. An excessive demand for deliveries that can be satisfied only by incurring additional transactions costs to permit delivery of the CTD note can also cause the futures price to become artificial. The futures price will rise artificially to reflect these transactions costs. Moreover, pronounced distortions in prices prior to the last delivery day—distortions that were manifest in the June, 2005 Ten Year contract throughout the class period—provide a signal to market participants that the CTD is in short supply, and that non-CTD

[83] Pl. Ex. 46.
[84] Email from Brooksey@bloomberg.net (Mallory Brooks) to John.brynjolfssonn@PIMCO.com, 7 June, 2005.

deliveries may occur unless additional supplies of the CTD are found. This distortion provides an incentive for market participants to pay artificial prices or to undertake extraordinary measures (and costs) to secure supplies of the CTD that would not be available under normal market conditions. If successful (where success is by no means certain), these measures can vitiate the need for non-CTD deliveries. Nonetheless, the threat of deliveries of these additional amounts of the CTD cause the futures price to be artificial; are inefficient because the extraordinary measures are costly; and would be unnecessary but for the necessity of satisfying a large long's threatened excessive demand for deliveries. Moreover, the price distortions that spur market participants to undertake these extraordinary measures contravene the economic function of futures markets. Therefore, in my opinion, threats of deliveries of the CTD in amounts substantially in excess of estimates of the float are indicia of manipulation, and confirm that the large long who takes these deliveries is causing a price distortion.

215. In my opinion, a negative basis net of carry is symptomatic of an artificial price, and results from either (a) an expectation of deliveries of non-CTD notes, or (b) an expectation of deliveries of CTD notes at excessive transactions costs.

216. Futures markets price probabilities. The future is uncertain, and hence the future realizations of factors that determine the value of deliverable securities are uncertain. Market participants trade on the basis of their estimates of the likelihood of value-relevant events that will prevail at the time of contract expiration. That is, futures prices reflect the probability of various outcomes that may prevail at delivery.

217. Any position, action, or conduct that increases the probability that shorts will have to make inefficient deliveries (either of non-CTD notes or CTD notes at excessive transactions costs) injects artificiality into futures prices. Similarly, any failure to act (notably, a failure to liquidate enough of a futures position) that increases the probability of inefficient deliveries injects artificiality into futures prices.

218. PIMCO's position was so large that it had the ability to influence the probability of inefficient deliveries, and hence the ability to cause an artificial price. Moreover, PIMCO engaged in conduct that directly affected the likelihood of inefficient deliveries.

219. On 16 May, 2005, PIMCO's futures position was in excess of $35 billion in principal amount of US Treasury notes. In addition, on this date, PIMCO held approximately $3 billion of the CTD note. Hence, its futures position was almost 60 percent larger than the total supply of the CTD note it did not own—approximately $22 billion. Since the "float" in the February, 2012 note was necessarily lower than the total outstanding amount of that security, PIMCO's futures position was substantially larger than the float of the CTD note. On the basis of its futures position, PIMCO could force uneconomic deliveries.

220. By 25 May, PIMCO had reduced its futures position somewhat, but had also increased its ownership of the CTD note. By that date, PIMCO owned about $6.2 billion of the CTD note, leaving a total supply outside of its ownership of about $19 billion. The float of the note was necessarily less than $19 billion. On that date, PIMCO owned futures allowing it to demand delivery of almost $22 billion in

principal amount of Treasury notes, more than the total supply of the CTD note, and necessarily more than the float in the CTD note.

221. Throughout the balance of May and June, 2005, PIMCO retained a large futures and cash position. Specifically, until 8 June, 2005 its combined position in June futures and the CTD note exceeded $20 billion. From 9 June through 30 June, PIMCO held a combined futures-CTD position of approximately $18 billion. Indeed, PIMCO increased its combined position on the last trading day of the June contract.

222. Throughout the class period PIMCO's combined cash and futures position exceeded prevailing estimates of the available supply of the CTD note. In my opinion, due to PIMCO's maintenance of such a large futures and CTD position, it was reasonable for market participants to conclude that that due to the large remaining open interest in the June contract, that there was a substantial probability of uneconomic deliveries against the June contract.

223. The basis net of carry was negative throughout May and June, 2005. In my opinion, the net basis was negative by the large amounts observed during 9 May-21 June due to PIMCO's conduct.

224. PIMCO represented a large and rising fraction of the open interest during May and June. From 9 May onwards, PIMCO intended to delay rolling its June futures position in order to cause the June contract to richen and exploit potential for congestion in the June contract. From 26 May onwards, PIMCO accounted for more than 20 percent of the open interest in the June contract. By 6 June, and throughout the remaining days of trading on the contract, PIMCO accounted for more than half the entire open interest. It was therefore necessarily the largest single market

participant after 6 June, and held a dominant position in the market throughout the class period. That is, its position was so large that its delivery and liquidation decisions affected the likelihood of uneconomic deliveries independent of the actions of other market participants. Therefore, in my opinion, through its liquidation and delivery decisions, PIMCO exercised a decisive influence over the likelihood of inefficient deliveries. Since price relations in the market were driven by the prospect of increased inefficient deliveries, PIMCO was a direct cause of the inflation in the June futures price.

225. On any date in the class period, PIMCO could have reduced—and indeed eliminated—the artificiality in the June futures price and the price of the CTD note by liquidating additional futures contracts. In particular, if PIMCO had liquidated its entire position (as it had done on prior contracts), the prospect for uneconomic deliveries would have disappeared, and the artificiality in the futures price would have disappeared accordingly.

226. In this regard, the roll out of the June contract was ahead of schedule during May. If PIMCO had liquidated as a responsible market participant from 9 May forward, it would have accelerated this trend. Moreover, after 1 June, the open interest in the June futures contract net of PIMCO's position in futures and the February, 2012 note was smaller than prevailing estimates of the float in the February, 2012 note, and after 3 June it was smaller than the amount that had been delivered against the March contract.

227. A squeeze that forces inefficient deliveries requires a "critical mass" in a futures position held by a single firm. Therefore, a liquidation by PIMCO even before its

open interest net of its position was smaller than the prevailing estimates of the float would have dramatically altered the market's perceptions about the likelihood of uneconomic deliveries, and eliminated the artificiality in the futures price.[85]

228. PIMCO's own calculations demonstrate how it had the power to cause an artificial price based on its large position. On 23 May, Mr. Zhu emailed Mr. Gross. In this email, he agreed to the use of basis trades into the CTD note (which I analyze infra), and stated that "if we take delivery of 200K, and assume rest of mkt take another 120K (happened [sic] to TYH 5), then 7bln would be non-CTD, which is worth 7/32."[86] Similarly, in a June, 2005 email to the Investment Committee and Mr. Keller, Zhu, stated: "[i]f we assume rest of market takes another 10 bln delivery, and total free floating CTD around 20 bln, so the chance of getting non-CTD would be 20%."[87]

229. In both emails, Mr. Zhu stated flatly that the richness in the June contract was a reflection of the amount of non-CTD deliveries. This view was also expressed by Ms. Hsu, as well as by market commentators.

230. Mr. Zhu's logic implies that PIMCO's actions could directly impact the futures price by affecting the perceived amount of non-CTD deliveries. Consider Mr. Zhu's first example. If PIMCO took no deliveries, per Mr. Zhu's reasoning, there would be no non-CTD deliveries, and hence no richness in the June contract. Similarly, in his second example, if PIMCO had reduced its futures position substantially without

[85] PIMCO's Mr. Zhu understood that the exercise of market power was more likely when a single player had "critical size." Pl. Ex. 7. Pirrong, supra note 12, presents a model in which multiple participants exercise market power. However, in this model, holding open interest constant; price artificiality is greater when a single firm holds a disproportionately large position.

[86] Pl. Ex. 35. Mr. Zhu's analysis appears to assume that all of the February, 2012 note would be available for delivery. The issue size is about $25 billion, and Mr. Zhu's calculations imply delivery of $32 million, thus accounting for the $7 billion non-CTD deliveries.

[87] Pl. Ex. 35.

purchasing the CTD, the likelihood of non-CTD deliveries—and hence the contract's richness—would have declined accordingly.

231. As the holder of a large long position, PIMCO exerted a material influence over the open interest, and hence exerted a material influence over the likelihood of non-CTD deliveries and the rate of the roll. PIMCO's omissions and conduct thereby impacted directly the richness of the June contract. If it had liquidated more of its positions, as it had done in previous expiration cycles, the market's perception of the probability of inefficient delivery would have declined. Therefore, on far more than a one-to one basis, by failing to liquidate additional contracts at times throughout the class period when per PIMCO's own estimation the contract was rich, PIMCO caused the price to be supercompetitive.

232. Mr. Zhu in fact realized that (a) the June price was artificially rich, and (b) this was due to a "squeeze."[88] Since PIMCO held a very large long futures position throughout the class period, liquidated its position far more slowly than it had done in recent contracts, and stood for almost all of the record deliveries against the June contract, the immediate implication of Mr. Zhu's contemporaneous and candid analysis is that PIMCO was the squeezer (i.e., the manipulator), and caused the squeeze and the resultant artificiality that Mr. Zhu acknowledged in Pl. Ex. 187.

233. In an 8 June 2005 email to Mr. Zhu, Mr. Keller wrote "basis trading out of june incurs very large transactions costs and can impair the value of our entire position."[89] Read in context, I interpret "large transactions costs" to mean that PIMCO trades had

[88] Pl. Ex. 187.
[89] Pl. Ex. 50.

a large price impact; price impact is a well-recognized component of transactions costs.

234. In an email to CFTC staff member Elverse Alexander on the same day, Mr. Keller wrote: "[w]e would like to sell out of June and into cash today to take advantage of rich june futures to cash market but the liquidity is not there. We have been trying to sell June 100 at a time and it is very difficult. If we push the market while trying to liquidate 5-10k today we would simply be destroying the value and liquidity for the remaining 140k we own."[90] That is, Mr. Keller recognized that (a) the June was rich, but (b) selling additional contracts would have eliminated the richness. Mr. Keller's analysis suggests that a liquidation of 10,000 contracts would have eliminated the richness in the June futures.

235. Other PIMCO traders echoed Mr. Keller's views. For instance, on 14 June, 2005, Mr. Rodosky wrote Mr. Keller: "Liquidity in the June contract is so thin though, that we are unable to move a significant percentage of our position. I will point out that the market is typically 50-100 contracts up, and hitting a bid moves the calendar [i.e., the June-September spread] by a quarter to a half tick immediately. I will then note that we must be respectful of those levels at which we execute on behalf of our clients, i.e., if the contract is 6 ticks rich, we don't want to wipe out the richness of the contract and only have 1000 sales to show for it."[91] Similarly, on 15 June Mr. Rodosky emailed the Investment Committee that "[o]nce the basis started moving and more people started talking about the open interest decline, I stopped selling, so as not

[90] Pl. Ex. 66
[91] Pl. Ex. 157.

to accelerate the contract's cheapening."[92] That is, even relatively small sales of futures (on the order of 1000 contracts) could eliminate 6 ticks of richness.

236. PIMCO held a large position relative to estimates of the readily available supply of the February, 2012 note. Given the tight supply-demand balance, the market was sensitive to changes in the probability that non-CTD deliveries would be necessary. As the holder of a significant position in the June Futures, and the holder of a significant position in the February, 2012 note, PIMCO could and did affect the probability through its trading. The more PIMCO liquidated into non-CTD instruments, the less likely the need for non-CTD deliveries and the cheaper the future. The less PIMCO liquidated (and the less it liquidated into non-CTD notes), the more likely the need for non-CTD deliveries, and the richer the contract. This was reflected in the acute sensitivity of contract richness to PIMCO's trading—a fact lamented by PIMCO decision makers.

237. Peer reviewed academic research shows that when the likelihood of manipulation is high, the price impact of trades is elevated, i.e., market depth and liquidity are low under this condition.[93] Under these circumstances, a large long's trading decisions can have large effects on prices. PIMCO's own characterization of the lack of liquidity in the June futures, and its statements that its trades had large impacts on prices, and that larger liquidations would have eliminated richness altogether, all attest to this.

---

[92] Email From Steve Rodosky to Investment Committee, 6/15/2005, 3:25 PM.
[93] Stephen Craig Pirrong, Mixed Manipulation Strategies in Commodity Futures Markets, 15 J. Futures Market (1995) 13. Praveen Kumar and Duane Seppi, Futures Manipulation With "Cash Settlement," 47 J. of Fin. (1992) 1485.

238. PIMCO sharply increased its holdings of the CTD note in from 9 May through 24 May. It did so at a time when the market was already concerned about the possibility of a squeeze of the June contract. Market participants were aware of PIMCO's purchases, which indicated an impending squeeze, and caused increasing artificiality in prices.

239. With the intent to cause the June futures price increase, PIMCO eschewed rolling and made basis trade purchases of February, 2012 notes on 9 May. This caused the richness in June futures prices to move to an unprecedented level, as documented in the futures valuation reports produced by PIMCO on the morning of 10 May.

240. PIMCO's made basis trade purchases of February, 2012 note during 20 May-24 May in an amount in excess of $3 billion—or about 12 percent of the outstanding amount and 20 percent of prevailing estimates of the float. These extraordinarily large purchases were followed by extraordinarily large increases in the richness of the June contract.

241. By increasing its holdings of the CTD note, PIMCO reduced the supply available to be delivered. This, in turn, increased the probability that shorts would have to deliver more expensive notes against the futures contract.

242. If PIMCO had instead liquidated into non-CTD instruments, or rolled into the September contract, or done these things in combination, these large increases in richness would not have occurred.

243. The price impact of these purchases was foreseeably acute at this time due to the high open interest of the June futures contract relative to the size of the CTD issue. Under these conditions, market participants had reasonable concerns about the

adequacy of deliverable supply, and large purchases that exacerbated these concerns would predictably have an impact on prices.

244. In an interview with CNBC, Mr. Gross stated:

> I think that the Financial Times post problem this morning, probably best and in a less inflammatory way, they point out that the open interest of futures contracts has grown three-fold in the past few years, Ron, while the deliverable collateral has actually shrunk due to Asian purchases and the like. In other words, you know, it's a crowded trade these days and as such, getting through the same door at the same time has become more difficult.

245. PIMCO's purchases of the February, 2012 note during May, 2005 and its failure to roll when the market was trying to "get through the same door at the same time" (during the roll from the June to the September contract) caused artificial prices. That is, through its purchases of February, 2012 notes PIMCO purposely obstructed the "door" at the precise moment market participants wanted to use it to exit their positions. In my opinion, this action was manipulative, and was perceived by market participants as a threat that PIMCO would squeeze and manipulate the June contract. In the normal operation of futures markets, these purchases were known to market participants, and increased market participants' estimation of the likelihood of a squeeze of the June contract. This estimation was a normal, reasonable market response to PIMCO's actions. Thus, the artificial price movements observed during this period were a direct and predictable response to PIMCO's actions.

246. In essence, acquiring the February, 2012 notes via basis trades merely moved forward in time PIMCO's standing for delivery. That is, taking delivery involves exchange of a long futures position for a long position in the deliverable. A basis trade into the CTD does exactly the same thing. By engaging in large basis trades in mid-May, PIMCO signaled to the market that a large participant was intending to take

ownership of large quantities of the CTD note; a party interested in liquidating its futures position outright, without transforming that position into one in the CTD note, would have sold outright, rolled into September contracts via basis trades, or basis traded into other instruments. PIMCO's basis trades into the February, 2012 notes greatly increased the market's estimation of the likelihood of an impending squeeze in the June contract.

247. As documented in section VII supra, PIMCO's purchases of large quantities of the February, 2012 note coincided with a dramatic runup in the price of these notes; a large increase in the "specialness" of these notes in the repo market; and an unprecedented richening of the futures contract relative to the price of the CTD. This is reflected in the analysis of prices and price relationships presented supra, and also in PIMCO's contemporary analyses of price relationships, notably the net basis, the price of the CTD relative to the prices of different instruments, and swap spreads. In my opinion, price artificiality is a foreseeable result of such an action, and artificiality in fact spiked at precisely the time PIMCO was obstructing the exit.

248. Recent research demonstrates that the prices of Treasury securities respond to variations in order flow.[94] Moreover, this sensitivity should be greater, the more vulnerable the market is to the exercise of market power due to fundamental

[94] Michael Brandt, Kenneth Kavajecz, , 59 J. of Fin. 2623 (2004) documents that "order flow imbalances (excess buying or selling pressure) account for up to 26% of the day-to-day variations in yields on days without major macroeconomic announcements. The effect of orderflow on yields is permanent and strongest when liquidity is low." Michael Brandt, Kevin Kavajecz, and Shane Underwood , Price Discovery in the Treasury Futures Market, J. Futures Markets (forthcoming) show that cash market order flow affects the futures market, and vice versa. Paolo Pasquariello and Clara Vega, Informed and Strategic Order Flow in the Bond Market (2005), also document that order flow impacts yields. Michael J. Fleming, Measuring Treasury Market Liquidity, 133 Federal Reserve Bank of New York Staff Report (2001) documents "highly significant price impact coefficients [i.e., high sensitivity of prices to order flow] such that a simple model that explains price changes with net order flow produces an R2 statistic above 30% for the two-year note. The price impact coefficients are highly correlated with bid-ask spreads and with episodes of reported poor liquidity."

underlying conditions in the market (e.g., the disparity between the cost of delivering the CTD and the next-CTD note).[95]

249. Recent empirical evidence documents that the sensitivity of prices to order flow is particularly acute when market conditions are highly volatile.[96] Indeed, this study shows that under stressed market conditions, there is "positive feedback" in the market for Treasury securities, whereby a large buy order that moves prices up, triggering additional buy orders that drive up the price even further.

250. Therefore, empirical evidence, economic theory, and my experience with markets all strongly imply that large purchases of the CTD note prior to delivery are likely have an appreciable price impact even if they occur, as here, a week or so prior to the delivery period.

251. Contemporaneous evidence from market participants supports this conclusion. For instance, as early as 27 January, 2005, Mallory Brooks of Morgan Stanley opined "[f]ollowing last quarter's squeeze on the Feb09 delivery into FVZ4 [the December Five Year Treasury Futures contract], I started thinking about the possibility that it . . . could happen to other contracts . . . . I came to the conclusion that there is more attraction and probability for someone to initiate a squeeze on the Feb12 delivery into TYH5 [the March Ten Year Treasury Futures contract]."[97] PIMCO's large increase in its holding of the February, 2012 note signaled just such a squeeze. The market's vulnerability to a squeeze was even greater for the June contract than the March.

---

[95] Pirrong, supra note 93, shows that this order flow sensitivity is greater when underlying economic conditions make the market more vulnerable to the exercise of market power.
[96] Benjamin H. Cohen and Hyun Song Shin, Positive Feedback Trading Under Stress: Evidence from the US Treasury Securities Market (2003).
[97] Email from Brooksey@bloomberg.net to srodo@bloomberg.net .

252. On 16 May, 2005, Steve Zwick of Lehman Brothers emailed Mr. Rodosky of PIMCO, saying "[e]arly talk of potential squeeze in 10yr."[98] Mr Zwick has testified that he heard rumors at this time that PIMCO was squeezing.[99]

253. Ms. Hsu testified that she heard that PIMCO's actions caused the unprecedented richening of the June contract on 24 May, 2005.[100]

254. Other communications at this time reflect the fact that PIMCO (or "real money" or a "bond fund") was squeezing the June contract.

255. On 25 May, Alex Von May of Citigroup Global Markets wrote an email with the subject "TYM – 7YR PRIMER." He attached a "nice piece" from a Citigroup Five Year Treasury trader stating: "[r]eal money is heavily involved with the contracts as we know on the long side. Large bond funds and foreign accounts own many of the off the run ten year sector including the 2/12s . . . . Put all of this together and you get an issue that's float is smaller because of real holdings . . . I think someone is long this issue on the curve, probably in the repo market, and is long the June contract. They know that the hedge community is short the basis, real money is long the issue and that there is dislocation on the contract roll."[101]

256. In my opinion, the term "real money" refers to investors such as PIMCO, in contrast to "fast money" hedge funds. Indeed, in a conversation with market surveillance personnel from the Federal Reserve Bank of New York, PIMCO's Mr.

---

[98] Email from Steve Zwick to Steve Rodosky, 16 May, 2005.
[99] Zwick Dep., at 27-28.
[100] Hsu Dep., at 207.
[101] Pl. Ex. 33.

Keller distinguished his firm from hedge funds by referring to itself as a "real money fund."[102] I further note that PIMCO was the largest bond mutual fund.

257. The Citigroup trader's characterization of the market cannily described PIMCO's position as a large, "real money" investor holding a large long futures position and a large position in the CTD. I note that this trader also characterized the market as being squeezed.

258. Nor is this all. At 8 AM on 25 May, Mike Crane of Chicago Capital Markets emailed Mr. Rodosky and Mr. Keller, that stated "[t]he entire cheapest to deliver 10yr is owned by China (safe) and PIMCO. . . Nice little squeeze."[103]

259. Also on 25 May, several Bloomberg-mails discuss the squeeze in the Ten Year Futures, with one saying that "everyone has noticed" it.[104]

260. On the same day, Arthur Bass of FIMAT USA emailed an article by Alyce Andres-Frantz and Joe Plocek to Ken Miller at PIMCO. The article was titled "Feds Rumored acting to Avert 4-7/8 % Feb'12 Squeeze." It stated that "[t]he repo market was awash with rumors Wednesday of a squeeze in the 4-7/8s of Feb. 2012."

261. Also on 25 May, Gregory Asikainen of Goldman Sachs warned "[t]he distressed levels in the financing markets suggest that there is a higher probability of delivery disruptions."

262. Another basis for my opinion is that PIMCO was directly aware that its activities could influence market participants' estimation of the likelihood of a squeeze, and thereby affect prices and price relationships.

---

[102] Pl. Ex. 34.
[103] Pl. Ex. 111.
[104] Pl. Ex. 115.

263. Specifically, on 17 May, 2005, Mr. Zhu emailed Ms. Hsu, stating "we stopped buying 2/12 as it may create impression that we are trying to squeeze the issue."[105] That is, Mr. Zhu recognized that (a) market participants would be able to observe PIMCO's activities in the market, and (b) they were likely to infer that large purchases of the CTD note signaled the possibility of an impending squeeze. In a related context, Mr. Zhu stated that the market's recognition of a potential squeeze could set off a "market panic" that would richen the price of futures and the CTD.[106]

264. Nonetheless, less than a week later on 23 May, Mr. Gross, Mr. Keller, and Mr. Zhu agreed to a plan whereby they used basis trades to accumulate additional amounts of the February, 2012 note.

265. Similarly, at 5:24 AM on 27 May, in response to an inquiry regarding an Investment Committee meeting on the 26 May, Mr. Keller wrote an email referring to a "Tuesday" meeting of the Investment Committee that addressed "changing our strategy/game plan surrounding taking delivery because of the potential for maybe some bad publicity."[107] The Tuesday prior to Mr. Keller's Friday email was 24 May, the date on which PIMCO's purchases of the February, 2012 note peaked, the price of that note relative to those of related securities peaked and caused the panic in the market and the resulting increase in the artificiality of prices.

266. PIMCO then dramatically reduced the pace of its acquisition of the CTD note after 24 May. After the market began to absorb this, the amount of artificiality declined.

---

[105] Pl. Ex. 17.
[106] Pl. Ex. 51.
[107] Pl. Ex. 31.

267. On 8 June, 2005, the Business Conduct Committee of the CBOT sent Mr. Keller a stern letter spelling out PIMCO's "responsibility to use its best efforts to assist in the maintenance of an orderly market." The letter further reminded PIMCO of exchange rules against manipulation and corner attempts.

268. Starting 9 June, 2005, PIMCO reduced its holdings of the CTD note by approximately 10 percent.[108] As I document supra, artificiality in the June futures price, which had been rising until 8 June, began to fall on 9 June. This is consistent with economic theory, which predicts that an action—such as a large long's sale of the CTD security—that reduces the likelihood of a squeeze should cause a decline in price artificiality.

269. Again, Mr. Keller specifically recommended the purchase of the CTD note with the objective of "effectively monetizing [sic] the likelihood of being delivered the second cheapest to deliver."[109] By holding the CTD note, and thereby reducing deliverable supply, PIMCO increased "the likelihood of being delivered the second CTD." Given the relation between price artificiality and the likelihood of inefficient deliveries, the higher this likelihood, the greater the artificiality in the futures price.

270. Combined with its refusal to sell large parts of its holdings at rich prices, and its other conduct, in my opinion, PIMCO's purchases of February, 2012 notes caused the price of the June contract to be artificial.

271. In my opinion, no other market condition can explain the demonstrable richness of the June futures contract during the class period, or movements in this richness during May and June.

---

[108] Pl. Ex. 6.
[109] Jim Keller email to Investment Committee, 23 May, 2005.

272. In particular, although the Federal Reserve did release the notes of its 3 May meeting minutes on 24 May, there is no well-recognized economic theory that would predict that this announcement would disproportionately affect (a) the price of one Treasury security (the February, 2012 note), or (b) the June futures contract. Indeed, any assertion that a monetary policy announcement would affect one point in the middle of the yield curve far more than adjacent points is risible.

273. Furthermore, there is no well-recognized economic theory that would predict that Federal Reserve monetary policy would cause (a) a particular futures price to be rich relative to the underlying CTD security or to alternative investments, or (b) that underlying CTD security to be historically rich relative to alternative investments. Nor is there any well-recognized economic theory that would predict that Federal Reserve monetary policy would cause a particular security to trade special in the repo market while other, closely related securities were not trading so special.

274. Nor have I identified any other event that occurred during the class period that would reasonably tend to cause movements in the futures price relative to the price of the CTD, or to the prices of on-the-run Treasury securities; or would reasonably tend to cause movements in the price of the CTD relative to the prices of on-the-run Treasury securities; or would reasonably tend to cause one old Treasury note to become extremely special in the repo market for a period ending on the delivery date, but not to be special for a period beginning on the delivery date. All of these relative price movements are highly anomalous. They are also predictable consequences of manipulation and manipulative conduct.

275. It is sometimes argued that shorts cause price distortions by failing to take the appropriate measures to secure deliverable supplies. I have reviewed position information from one prominent short in the June contract—Citadel. In my opinion, Citadel took prudent measures to secure deliverable supplies. Moreover, contemporaneous market reporting states that many large shorts put the CTD note "in the box" to ensure its availability for delivery. That is, they purchased the note, and financed it at LIBOR rather than special repo, in order to ensure that they had possession of the note for the purpose of making delivery. Given the disruptions in the repo market at the time, with numerous "fails" to deliver, shorts would have faced considerable difficulties ensuring their access to the CTD security had they not "boxed" it. Therefore, in my opinion, boxing was a prudent measure that mitigated the artificiality in the June futures price. Although boxing arguably contributed to the chronic fails in the repo market during May and June, the ultimate responsibility for these fails lies with PIMCO; the company's huge futures position and the implied threat of delivery—carried out in the event—made it imperative for shorts to take prudent measures to ensure their control of the CTD to permit them to make delivery against futures. If PIMCO had reduced its futures position and/or CTD position, it would have reduced the need to secure notes for delivery, and hence would have freed up CTD notes in the repo market. Thus, in my opinion, shorts acted prudently, and PIMCO's manipulative acts were the ultimate cause of the fails and extremely special overnight repo rates in May and June, 2005.

276. In my further opinion, the fact that shorts were able to secure CTD securities for delivery against PIMCO's futures and repo positions, and the other (relatively small)

outstanding long futures positions in quantities far in excess of the nearly uniform estimates of the float of the February, 2012 note indicates that shorts acted extremely diligently to secure deliverable supplies. Moreover, as noted supra, in my opinion the manifest artificiality in the price of the June future provided the incentive to engage in such costly efforts, which would have been unnecessary but for PIMCO's standing for excessive deliveries.

276. My work in this matter is ongoing. I continue to review data and documents, and reserve the right to create and produce additional exhibits and analyses, and to supplement this report for the purposes of, inter alia, responding to defendant's expert reports and testimony, and expanding upon the opinions offered herein.

Dr. Craig Pirrong

5 March, 2007

5 March, 2007